PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

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SUPPLEMENTAL DATA TO PHOTOFACT FOLDER 9 IN SET 283

Motorola Models Y19CK1, B, Y19CK2, B, Y19CT1, B (Ch. TS-902AY-03, -04 & BP-902A-01), 19CK1, B, 19CK2, B and 19CT1, B (Ch. TS-902A-03, -04 & BP-902A-01) were covered in Photofact Folder 9 — Set 283.

The following changes were made during production.

Ch. TS-902A-01

TO IMPROVE BANDWIDTH

L34, 2nd. sound IF coil, changed to part #1V733254.

A 15KΩ resistor is omitted from pin 7 of V9B.

R93 is decreased from 6.8KΩ to 1KΩ.

The 68MMF capacitor connected across L34 is replaced by an 8.2KΩ resistor (R89).

C78, C80 and C81 are increased from 5000 MMF to .01MFD.

TO IMPROVE CONVERGENCE

T5, deflection yoke changed to part #24D734461. The two 1.2KΩ resistors and one 82MMF capacitor mounted on the yoke are omitted.

TO IMPROVE VERTICAL SYNC

C97 is decreased from a .03MFD to .015MFD.

R121 is increased from 390KΩ to 820KΩ.

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Ch. TS-902A-02

TO IMPROVE CONVERGENCE

T5, deflection yoke changed to part #24D734977.

The following changes are required when the new yoke is installed.

C119 is increased from 27MMF to 130MMF.

C120 is increased from .0047MFD to .01MFD.

R140, 1Meg, replaces the 470KΩ resistor and the 500KΩ drive control which were connected in series from pin 5 of V17 to ground.

R9, horizontal drive control, changed to "screen control".

A 125Ω, 5 watt resistor is replaced by L55.

V15 (vertical oscillator and vertical output) tube socket rewired. The vertical oscillator stage connects to pins 1, 2 and 3. The vertical output stage connects to pins 4, 5 and 6.

R125 is decreased from 120Ω to 82Ω.

R126 is added across the vertical deflection coils of T5.

R148 is decreased from 1.5KΩ to 820Ω.

R122 is disconnected from the 255V line and reconnected to the 410V line.

TO IMPROVE PURITY

The picture tube and the convergence coil assembly are rotated 180 degrees so that pin 4 is at the top and the blue gun is located at the bottom.

MOTOROLA MODELS Y19CK1, B, Y19CK2, B, Y19CT1, B (Ch. TS-902AY-03, -04 & BP-902A-01), 19CK1, B, 19CK2, B, 19CT1, B (Ch. TS-902A-03, -04 & BP-902A-01)

PRODUCTION CHANGES
BULLETIN 144

PRODUCTION CHANGES
BULLETIN 144

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	TO ELIMINATE CORONA To eliminate corona between the high voltage regulator cap and the magnetic shield, the HV regulator (V22) and brackets are moved toward the rear of the horizontal chassis. To eliminate corona between the focus control (R4) and the cabinet trim, a 1Meg resistor is connected between the control mounting nut and chassis. TO PREVENT FOCUS CONTROL FAILURE C123 is added.
Ch. TS-902A-03 BP-902A-01	TO IMPROVE COLOR AFC L41, 3.58MC burst amplifier coil is tapped, the new part # is 24B734843. L39, bandpass cathode follower grid coil is changed to part #24K734844. With this change the 4.7MMF capacitor and the 10KΩ resistor connected to pin 8 of V25 are omitted.
Ch. TS-902A-04	TO ELIMINATE SYNC BUZZ A 10KΩ resistor is replaced by L26. M12, 4th. video IF assembly (part #24B734522 - issue "A") is changed to issue "C". In this new version the 5MMF capacitor is omitted and the 1.5MMF capacitor is increased to 2.7MMF.
Ch. TS-902A-05	TO INCREASE DECOUPLING OF THE VIDEO AMPLIFIER C4A is increased from 10MFD to 50MFD. C3B is decreased from 50MFD to 10MFD. To accomplish the above these two sections are switched. TO IMPROVE VERTICAL SYNC R116 is increased from 6.8KΩ to 27KΩ. R117 is disconnected from the 165V line and reconnected to the 240V line. TO INSURE AFC BALANCE C151 and C152 are decreased from 1500MMF to 1000MMF.
Ch. TS-902A-05-0, TS-902A-06	TO IMPROVE CONVERTER RESPONSE R44 is decreased from 10KΩ to 6.8KΩ. R47 is increased from 12KΩ to 18KΩ. R52 is decreased from 18KΩ to 15KΩ.
Ch. TS-902A-07 BP-902A-02	TO ELIMINATE HORIZONTAL FOLD-OVER Horizontal retrace blanking is added. C102 is omitted. A .005MFD capacitor is added from the junction of C127, C128 and C129 to the junction of C147 and terminal 2 of T3. The lead connecting R127 to the deflection yoke plug is lengthened and dressed closed to the base of the chassis to prevent cross-coupling. TO IMPROVE VERTICAL EDGE CONVERGENCE C15, C16 and C17 are omitted. T10, T11 and T12 are connected directly to their respective convergence phase controls. R126 is decreased from 820Ω to 180Ω and connected in series with R16A, R18A and R20A. TO IMPROVE "Y" CHANNEL RESPONSE R77 is increased from 22KΩ to 100KΩ . TO IMPROVE CHROMA LEVEL C136 is removed from the center terminal of R5B (contrast control) and reconnected to the high side (pin 6 of V6B). TO IMPROVE EDGE PURITY The picture tube retaining strap is replaced with a PM rim purity device (part #1V735816). A ferrite ring (part #42A735749) is added to the new convergence coil assembly (part #1V734864 - red code). Deflection yoke cover changed to part #1V735762 which has the electrostatic shield mounted on the inside face.

	TO INCREASE VERTICAL SIZE To compensate for loss of vertical size due to the addition of the ferrite ring the vertical output tube (V15) is changed to a 6BX7. R125 is decreased from 82Ω to 47Ω. R121 is decreased from 820KΩ to 390KΩ. TO CENTER THE RANGE OF THE VERTICAL HOLD CONTROL R120 is increased from 390KΩ to 470KΩ when the vertical output tube is changed to a 6BX7. TO IMPROVE CONVERGENCE T5, deflection yoke changed to part #24D735814 or 24D734997 - red code.
Ch. TS-902A-08, BP-902A-03	TO INCREASE CHROMA GAIN A coil (part #24K732393) is added from pin 2 of V23 to the junction of C136 and L37. R162 is omitted. C64 is increased from 10MMF to 30MMF. TO PREVENT ARCING AT THE FOCUS CONTROL R4, focus control changed to part #18B735681. The 1Meg resistor added in change "02" is removed. TO INCREASE COLOR SHADING M11, variable capacitor is increased from 3.5-25MMF to 5-50MMF (new part #20A735765). A 4.7KΩ resistor added across the variable capacitor M11. C148 and R160 are omitted. A 47MMF capacitor added from pin 8 of V25A to L41. A 5.6KΩ resistor added from pin 8 of V25A to ground. A 1KΩ resistor added from pin 7 of V27 to ground. A 47MMF capacitor added from pin 7 of V27 to L47.

(Con't on reverse side)

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DENVER, COLORADO

SUPPLEMENTAL DATA TO PHOTOFACT FOLDER 14 IN SET 285

Sylvania Models 510, 513, 520, 521, 526, 571, 573, 575, 576, 577, 613, 621, 670 and 675 series (Ch. 1-521-1, -2, -3, -6, -7, -8) were covered in Photofact Folder 14 — Set 285.

Many new models and production changes were made in later production. Following is a complete list of all models and chassis used in each.

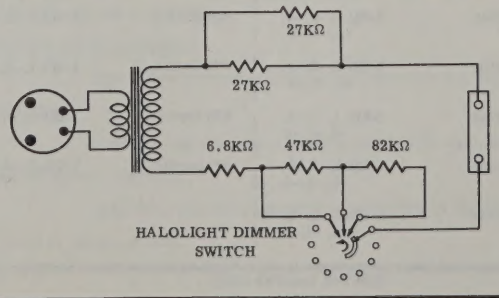
MODEL	CHASSIS	MODEL	CHASSIS
21C503 Series	1-521-7, -8	571 Series	1-521-1, -2, -3, -6, -7, -8
21C504 Series	1-521-7, -8	573 Series	1-521-1, -2, -3, -6, -7, -8
21C505 Series	1-521-7, -8	575 Series	1-521-1, -2, -3, -6, -7, -8
21C602 Series	1-521-7, -8	576 Series	1-521-1, -2, -3, -6, -7, -8
21D801 Series	1-521-7, -8	577 Series	1-521-1, -2, -3, -6, -7, -8
21T202 Series	1-521-7, -8	613 Series	1-521-1, -2, -3, -6, -7, -8
21T203 Series	1-521-7, -8	620 Series	1-521-1, -2, -3, -6, -7, -8
21T204 Series	1-521-7, -8	621 Series	1-521-1, -2, -3, -6, -7, -8
21T302 Series	1-521-7, -8	626 Series	1-521-7, -8
510 Series	1-521-1, -2, -3, -6, -7, -8	670 Series	1-521-1, -2, -3, -6, -7, -8
513 Series	1-521-1, -2, -3, -6, -7, -8	675 Series	1-521-1, -2, -3, -6, -7, -8
520 Series	1-521-1, -2, -3, -6, -7, -8	676 Series	1-521-7, -8
521 Series	1-521-1, -2, -3, -6, -7, -8	677 Series	1-521-7, -8
526 Series	1-521-1, -2, -3, -6, -7, -8		

SYLVANIA MODELS 21C503, 21C504, 21C505, 21C602, 21D801, 21T202, 21T203, 21T204, 21T302, 510, 513, 520, 521, 526, 571, 573, 575, 576, 577, 613, 620, 621, 626, 670, 675, 676, 677 Series (Ch. 1-521-1, -2, -3, -6, -7, -8)

(Con't on reverse side)

Ch. TS-902A-09 BP-902A-04	TO INCREASE OSCILLATOR INJECTION TO AFC The 47MMF capacitor added from pin 7 of V27 to L47 is decreased to 10MMF. The 1KΩ resistor added from pin 7 of V27 to ground is increased to 4.7KΩ. TO IMPROVE BANDPASS AMPLIFIER RESPONSE To minimize the effects of the burst take-off circuit on the bandpass amplifier response the lead connecting L39 (primary) to L41 is omitted. The primary-low side of L39 is grounded. A 5MMF capacitor added from pin 8 of V24A to the high side of L41. The 47MMF capacitor added from pin 8 of V25A to L41 is decreased to 10MMF. The 4.7KΩ resistor added across M11 in production change "08" is omitted. TO REDUCE 3.58MC OSCILLATOR DRIFT The capacitor (180MMF) shunting L45 is decreased to 150MMF (new part #21R121740).
Ch. TS-902A-09 (on some)	TO REDUCE CORONA To eliminate corona from V22 (HV Regulator) a new type insulator cap (part #14A736067) is used. TO IMPROVE CONVERGENCE A new convergence coil assembly (part #1V734864- green code) is used. In this new assembly the blue and green coils are rotated 180 degrees and remounted. The blue and green convergence coil slugs have the red and green leads interchanged.
Ch. TS-902A-09-0	Chassis TS-902A-09-0 is identical to chassis TS-902A-09, except the focus control and the 1Meg resistor added in production change "02" are once again used.

	The following production changes covers all models and chassis. TO IMPROVE VERTICAL LINEARITY C92 is decreased from .47MFD to .22MFD.
	TO PREVENT PICTURE BLOOMING A 15Ω, ½ watt resistor is added in parallel with R123.
	NEW HALOLIGHT CIRCUIT A new HaloLight circuit is used in models 21C504, 21C602, 21D801, 626, 676 and 677 series. A partial schematic is given below showing the new arrangement.
	TO IMPROVE SOUND SENSITIVITY R60 is increased from 22KΩ to 27KΩ.



AIRLINE MODELS
WG-1635A, WG-1636A

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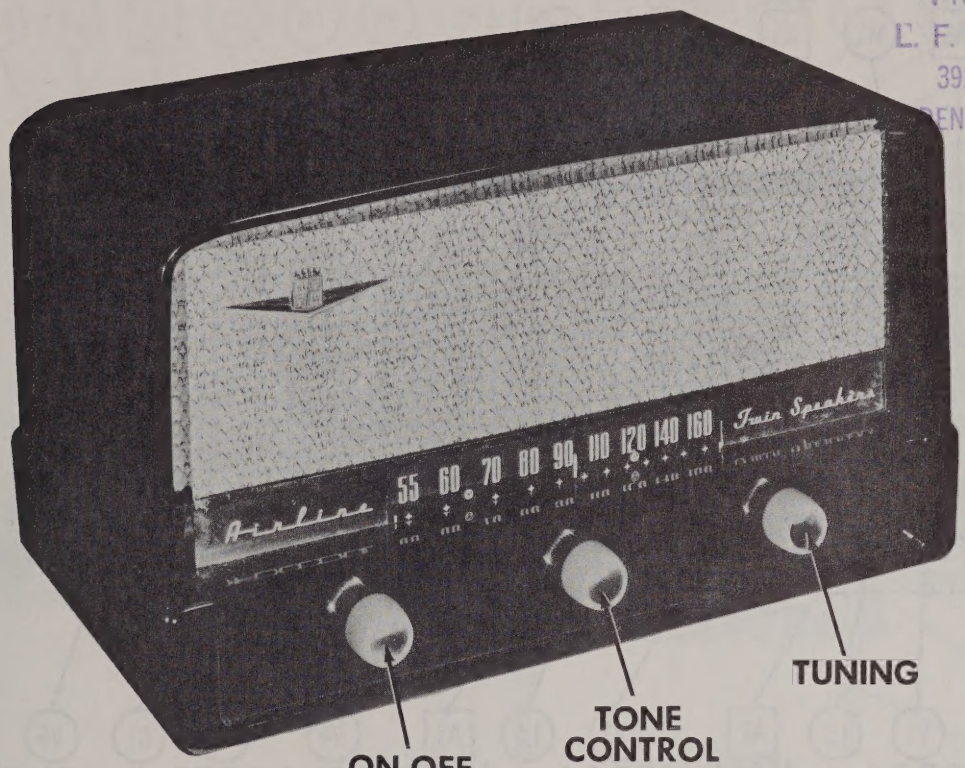

AIRLINE MODELS
WG-1635A, WG-1636A

TRADE NAME	Airline Models WG-1635A, WG-1636A
SUPPLIER	Montgomery Ward & Co., 619 Chicago Ave., Chicago, Ill.
TYPE SET	AC-DC Operated AM Superheterodyne Receiver
TUBES (Six)	Types: 12BA6 Mixer, 12BF6 Osc., 12BA6 IF Amp., 12AV6 Det.-AVC-AF Amp., 35C5 Output, 35W4 Rectifier
POWER SUPPLY	105-125 Volts AC/DC — RATING .25 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	540KC-1600KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-.
To set pointer, turn tuning capacitor fully closed and set pointer to last reference mark at low frequency end of dial.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 7 (grid) of 12BA6 (V2). Low side to B-.	455KC (400∿Mod)	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.	"	"	1630KC	"	"	A5	"
3.		Loop	1400KC	Tune to 1400KC signal	"	A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

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PARTS LIST AND DESCRIPTIONS

AIRLINE
Model WG-1635A

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		AIRLINE PART No.	STANDARD REPLACEMENT		
V1	Mixer	12BA6	12BA6	7BK	
V2	Oscillator	12BF6	12BF6	7BT	
V3	IF Amplifier	12BA6	12BA6	7BK	
V4	Det.-AVC-AF Amp.	12AV6	12AV6	7BT	
V5	Audio Output	35C5	35C5	7CV	
V6	Rectifier	35W4	35W4	5BQ	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	AIRLINE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	■100	150	45X427	AFH3-11	CO10	FP311.65	TM-T50-150	T-050	TVL-3442
B	▲70	150							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	AIRLINE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C2	.01	200		BPD-01	D6-103	CUB4S1	GP3-333-103	PT411	4TM-S1	
C3	.047	200	RCP10W2473M	BPD-05	DF-503	CUB2S47		PT4147	2TM-S47	
C4	47			N750-SI47	TCN-47	TN14	N750K-470	NT-5447	5TCU-Q47	
C5	.047	200	RCP10W2473M	BPD-05	DF-503	CUB2S47		PT4147	2TM-S47	
C6	.022	200	RCP10W2223M	BPD-02	DF-203	CUB4S22	817-02	PT4122	2TM-S22	
C7	.0047	600	RCP10W2472M	BPD-0047	D6-472	CUB6D47	GP2-333-472	PT6247	6TM-D47	
C8A	10000									
B	250		♦76X5	♦PA-112-3	♦PC-80	♦113TM1	♦1404-01		♦T-1	
C										
C9	.0022	600	RCP10W4222M	SI2200	D6-222	CUB6D22	GP2-333-222	PT6222	6TM-D22	
C10	.01	400		BPD-01	D6-103	CUB4S1	GP3-333-103	PT411	4TM-S1	
C11	.047	400	RCP10W4473M	BPD-05	DF-503	CUB4S47		PT4147	4TM-S47	
C12	.082	200	RCP10W2823M	P288N-075	DF-753			PT601		

♦ Items C8A, C8B, C8C, R10A and R10B are combined in one unit.
When replacing items separately, C8B and C8C should total 250MMF.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	AIRLINE PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	500KΩ	½	36X393	ABT-63	A47F4-500K	Q18-133X	UT429	Volume-tap @ 60KΩ
B	Shaft		Not Req.	AK-4	KSS-3	Not Req.	Not Req.	Attach to R1A
C	Switch		Not Req.	KB-1	SWE-12	76-1	US-26	Attach to R1A
R2A	1Meg	½	40X345	AB-69	A47-1Meg-S	Q11-137	U-54	Tone
B	Shaft		Not Req.	AK-4	KSS-3	Not Req.	Not Req.	Attach to R2A

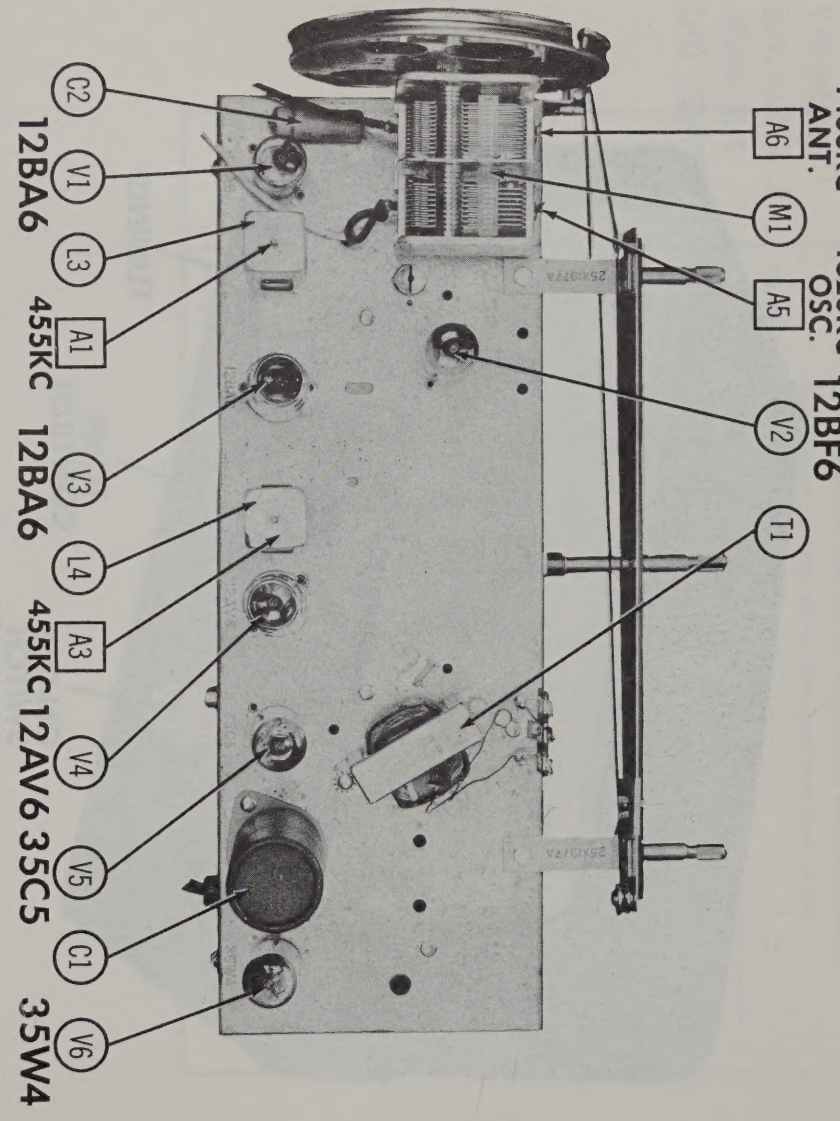
RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	AIRLINE PART No.	IRC PART No.	
R3	10Meg	½	B85106	BTS-10Meg	
R4	27KΩ	½		BTS-27K	
R5	1Meg	½		BTS-1Meg	
R6	68Ω	½		BTS-68	
R7	47KΩ	½		BTS-47K	
R8	22KΩ	½		BTS-22K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	AIRLINE PART No.	IRC PART No.	
R9	10Meg	½	B85106	BTS-10Meg	
R10A	500KΩ	½	♦76X5	BTS-470K	
B	500KΩ	½		BTS-470K	
R11	1000Ω	1		BTA-1000	
R12	180Ω	½		BTS-180	
R13	27Ω	1			

♦ Items C8A, C8B, C8C, R10A, R10B are combined in one unit.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	AIRLINE PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	2.4KΩ	7Ω	51X175A	Z1103					

SPEAKER

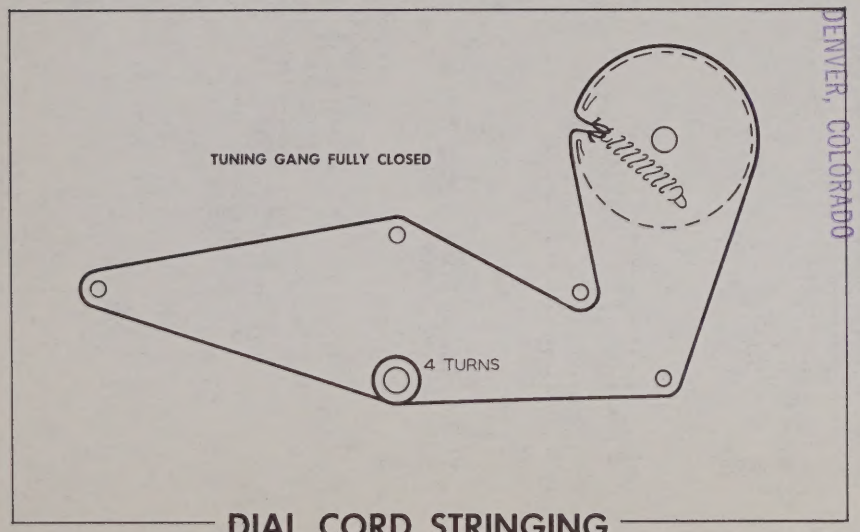
ITEM No.	RATINGS			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	AIRLINE PART No.	QUAM PART No.	
SP1	4"x 6"	PM	3.5Ω	12A531	46A1	
SP2	4"x 6"	PM	3.5Ω	12A531	46A1	

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	AIRLINE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Loop Ant.	1.7Ω		9A2378				Includes cabinet back
L2	Osc. Coil	5.5Ω*	1Ω	9A2379	14-1060		71-OSC	* Tapped @ .8Ω
L3	Input IF	16Ω	16Ω	9A2343	16-6758	BC-352	12-C1	
L4	Output IF	15Ω	15Ω	9A2344	16-6770	BC-355	12-C6	

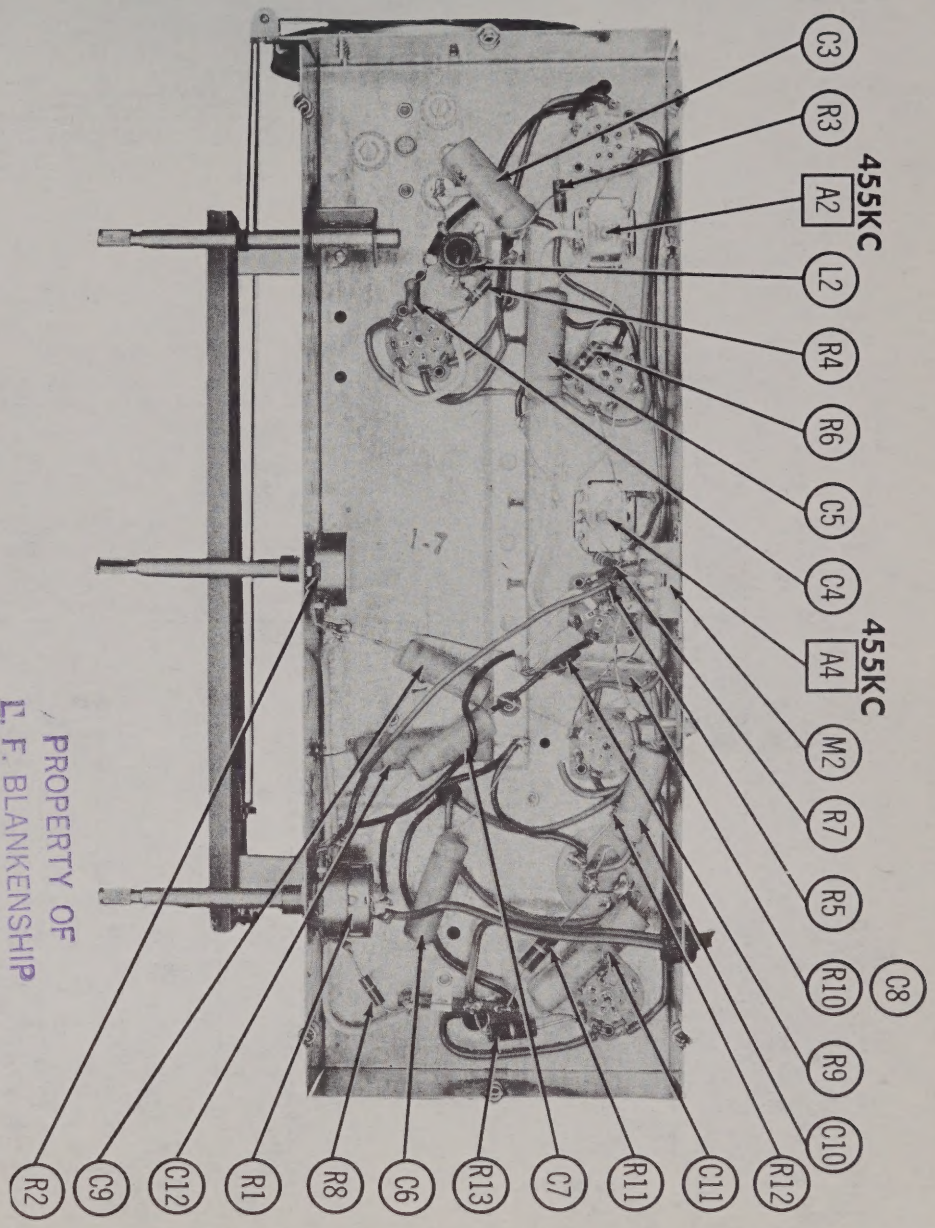
MISCELLANEOUS

ITEM No.	PART NAME	AIRLINE PART No.	NOTES
M1	Tuning Cap.	14A227	2 Gang (17-380MMF, 14-120MMF)
M2	Switch	2A402	Radio - phono (DPDT - Slide type)
	Cabinet	55X494	Brown
	Cabinet	55X499	Red and cream
	Knob	10A806	On-off-volume, tone & tuning - Brown cabinets
	Knob	10A808	On-off-volume, tone & tuning - Red and cream cabinets
	Dial Scale	58X782	Brown cabinets
	Dial Scale	58X790	Red and cream cabinets
	Dial Pointer	15X283	



DIAL CORD STRINGING

CHASSIS—BOTTOM VIEW



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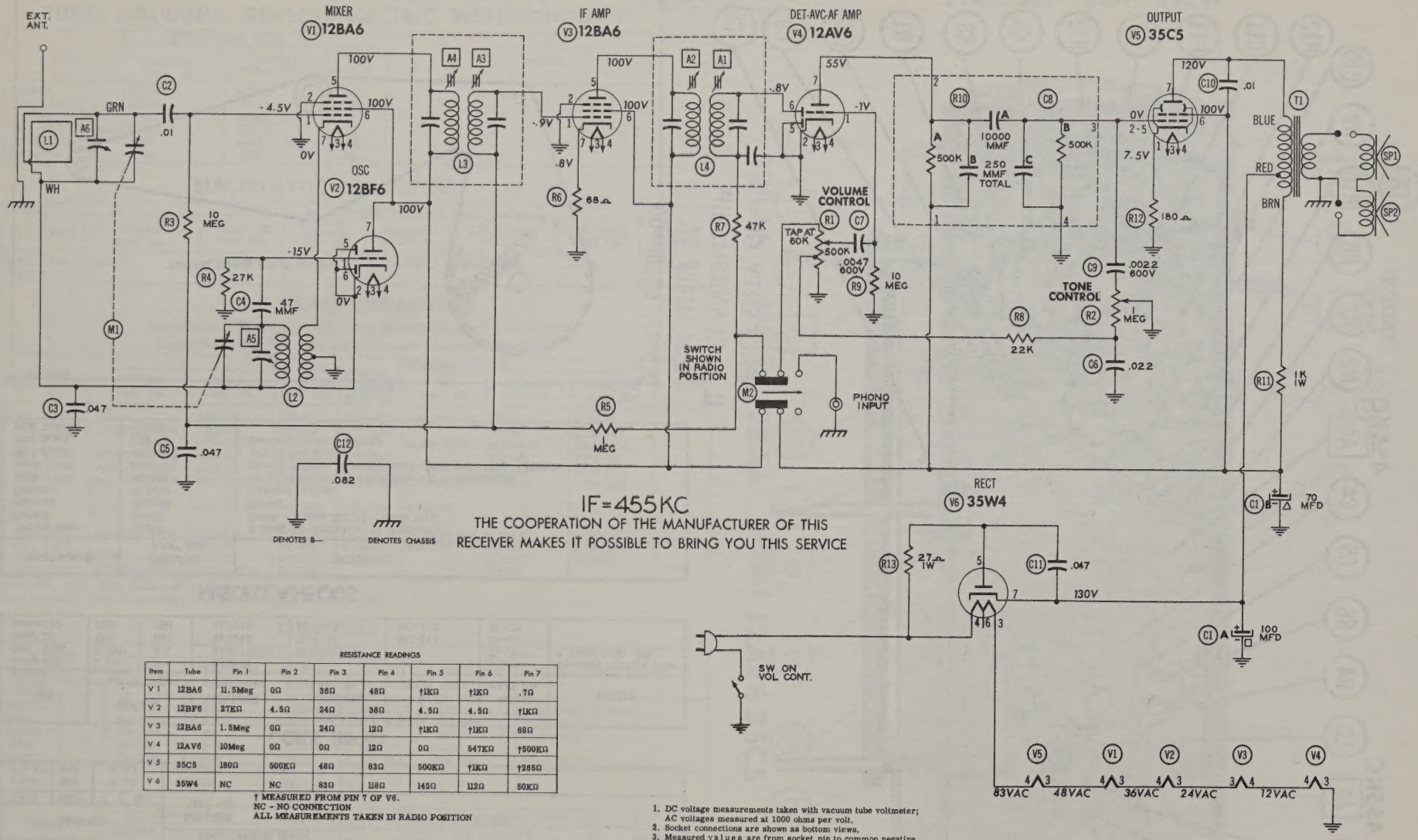
AIRLINE
Model WG-1635A



IF=455KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BA6	11.5Meg	0Ω	36Ω	48Ω	†1KΩ	†1KΩ	.7Ω
V 2	12BF6	27KΩ	4.5Ω	24Ω	36Ω	4.5Ω	4.5Ω	†1KΩ
V 3	12BA6	1.5Meg	0Ω	24Ω	12Ω	†1KΩ	†1KΩ	68Ω
V 4	12AV6	10Meg	0Ω	0Ω	12Ω	0Ω	547KΩ	†500KΩ
V 5	35C5	180Ω	500KΩ	48Ω	83Ω	500KΩ	†1KΩ	†265Ω
V 6	35W4	NC	NC	83Ω	118Ω	145Ω	112Ω	50KΩ

† MEASURED FROM PIN 7 OF V6.
NC - NO CONNECTION
ALL MEASUREMENTS TAKEN IN RADIO POSITION

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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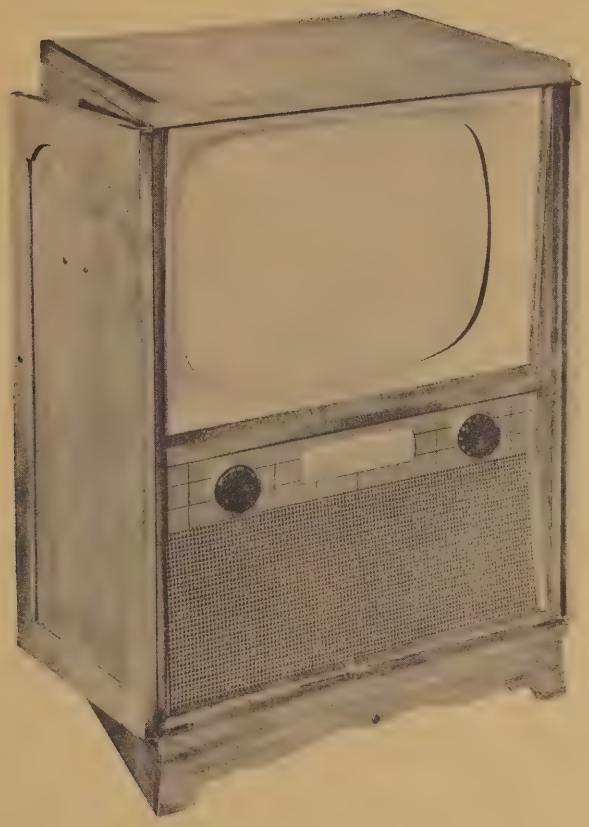

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ATR MODELS
26001, 2, 3, 4, 5 (Ch. 2600)

ATR MODEL 26002

TRADE NAME	ATR Models 26001, 26002, 26003, 26004, 26005 (Ch. 2600)
MANUFACTURER	American Television & Radio Co., 300 E. Fourth St., St. Paul 1, Minn.
TYPE SET	Television Receiver
TUBES	Twenty-Six
POWER SUPPLY	110-120 Volts AC-60 Cycles RATING 2.95 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13 VHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

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RETMA MEMBER

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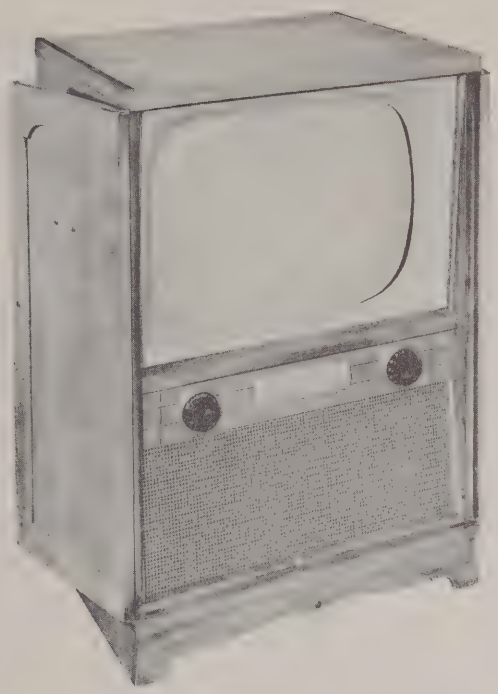

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 4 push-on type control knobs from front panel of cabinet.
2. Remove wood screws. Remove rear cover.
3. Disconnect speaker plug.
4. Remove pilot light.
5. Remove 4 chassis bolts. Remove chassis.
6. Remove 6 speaker nuts. Remove 2 speakers.

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MODELS	CHASSIS
26001, 26002, 26003, 26004, 26005	2600

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF tuner oscillator circuit may be accomplished by removal of the channel selector and fine tuning knobs. The adjustments are accessible, one at a time, thru the small hole in the cabinet to the right of the channel selector shaft.

PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass remove 11 wood screws holding wood strips at the sides and top of the safety glass. Remove wood strips and safety glass. Use extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION

See tube placement chart on page 5.

SPECIAL ADJUSTMENTS

A. AGC Control Adjustment

Tune in strongest TV signal in that area. Turn the AGC control (located on rear panel of chassis.) clockwise until sync appears unstable. Then back counter clockwise just beyond the point of unstable sync.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

The horizontal oscillator may be adjusted from the rear panel. Set the horizontal hold control at the center of its range and adjust the horizontal frequency slug (B1) until the picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, it is necessary to remove the rear panel and supply power to the set. Adjust the ratio detector secondary (A13) located on bottom of chassis for maximum volume and minimum buzz.

FUSES

Two fuses are used. One for horizontal sweep circuit protection and one for LV power supply protection. (For location see tube placement chart).

CENTERING

Centering is accomplished mechanically by means of a centering lever on the PM focusing assembly. Adjust the centering lever from side to side, and up and down until the picture is properly centered.

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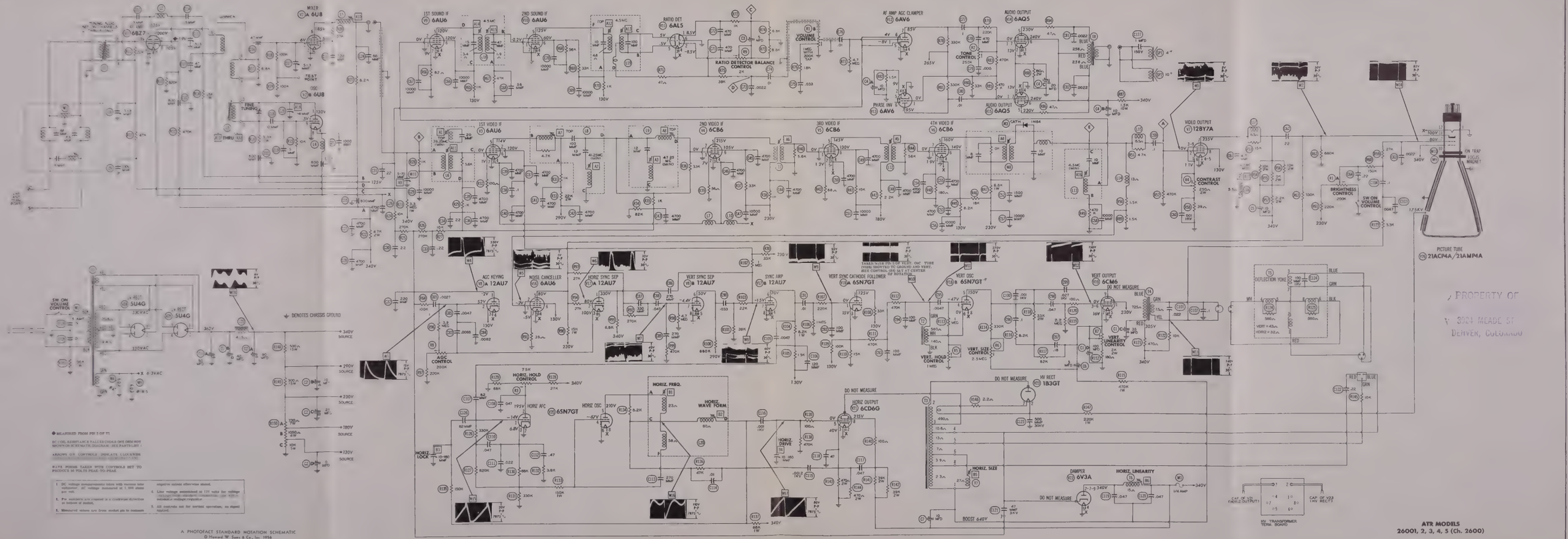

◆ MEASURED FROM PIN 5 OF V1

DC VOLS. RESISTANCE VALUES UNDER CHS ARE OHMS NOT SHOWN ON SCHEMATIC DIAGRAM - SEE PARTS LIST

▲ SHOWS CCW CONTROL SETTING. LOCK WISE SETTING SHOWN IN PARENTHESES

#VTVM POINTS TAKEN WITH CONTROLS SET TO PRODUCE 30 VOLTS PEAK-TO-PEAK

1. DC voltage measurements taken with vacuum tube voltmeter. AC voltage measured at 1,000 ohms per volt.
2. Pin numbers are viewed in a counter-clockwise direction on bottom of socket.
3. All controls set for normal operation, no signal applied.
4. Line voltage maintained at 117 volts for voltage measurements. Variations in line voltage may cause proportional variations in voltages.
5. Measured values are from socket pin to ground.

negative unless otherwise stated.

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CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

ATR MODELS
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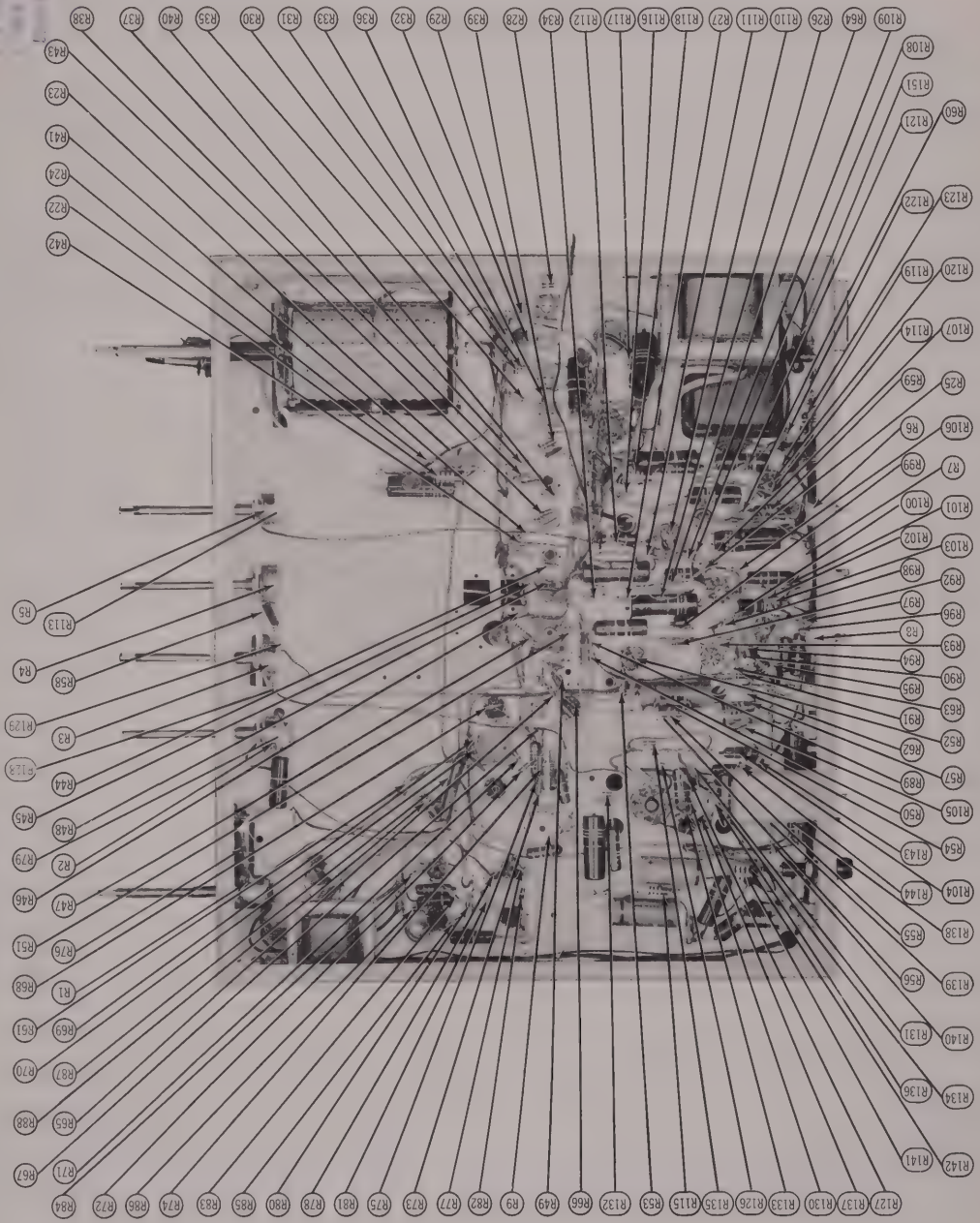
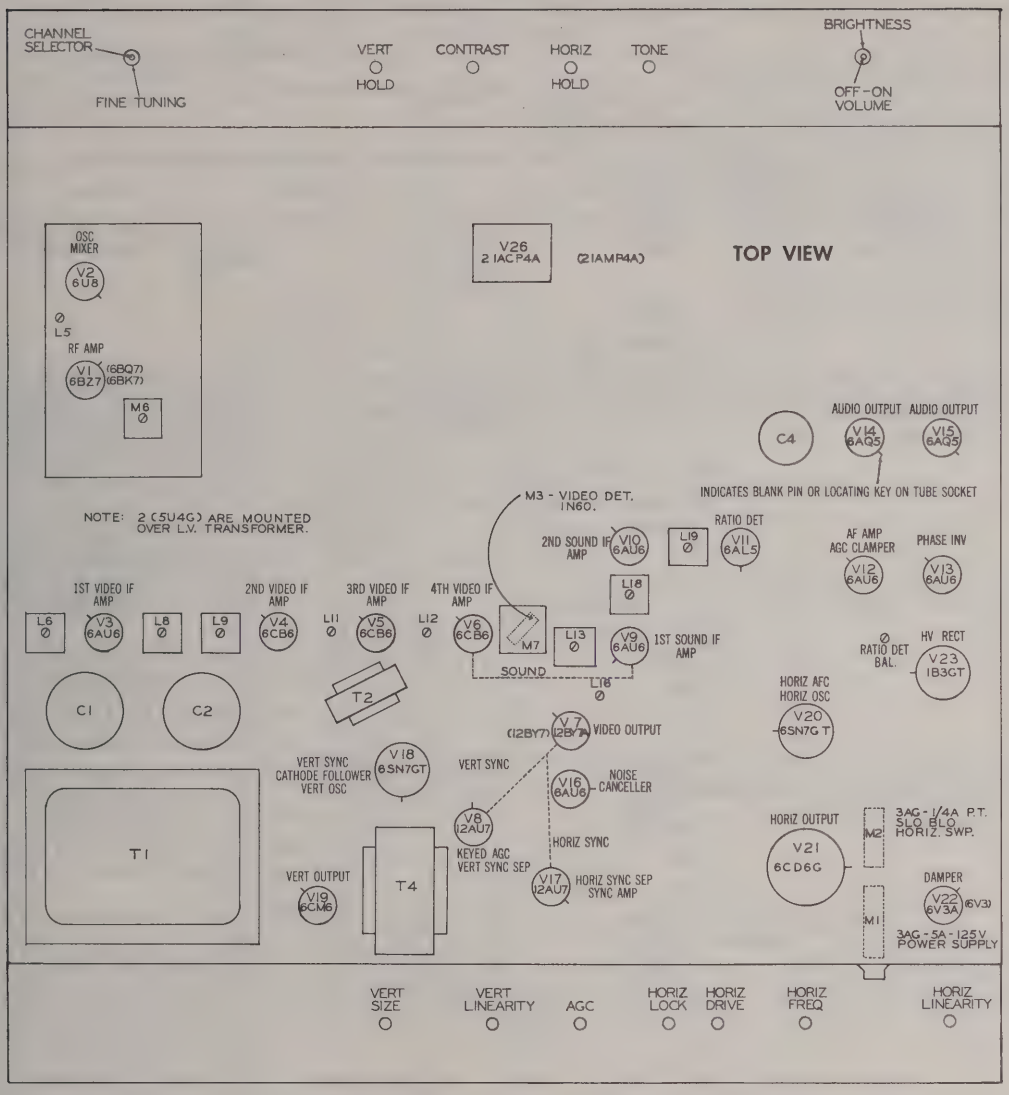
CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION



TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - **V24, V25, Fuse (M2)**

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - **V2, V3, V4, V5, V6**
No pic, no sound, has snow - **V1, V2, V3**
No pic, has sound, has raster - **V7, V8, V26**
Has pic, no sound - **V9, V10, V11, V12, V13, V14, V15**
Overloaded picture - **V8, V12**

SYNC FAILURE
No vert. sync - **V17, V18**
No horiz. sync - **V17, V20**
No vert. or horiz. sync - **V8, V17**

SWEEP FAILURE
No raster, has sound - **V20, V21, V22, V23, V26, Fuse (M1)**
No vertical deflection - **V18, V19**
Poor vert. linearity or foldover - **V18, V19**
Poor horiz. linearity or foldover - **V20, V21, V22**
Narrow picture - **V20, V21, V22, V23, V24, V25**
Vert. off freq. - **V17, V18**
Horiz. off freq. - **V17, V20**

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ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage shock hazard may be eliminated by removing the horizontal oscillator tube (V20) from its socket.

VIDEO IF ALIGNMENT

Remove the converter tube (V2) from its socket and replace it with a 6U8 which has pin 1 removed. This will disable the local oscillator and reduce the possibility of erroneous indications.
Connect the negative lead of a bias supply to the ungrounded side of C34. Connect the positive lead to chassis.
Adjust for negative 1 volt bias in steps 1 thru 8. In step 9 adjust bias for negative 6 volts.
Use only enough generator output for usable indication on scope and VTVM.
Use low marker generator output to prevent distortion of response curves.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	.001MFD	High side to point Ⓑ. Low side to chassis.	Not used	39.25MC (Unmod)	Any	Use VTVM. DC probe to point Ⓐ. Common to chassis.	A1	Adjust for -1.0 volt bias at ungrounded side of C34. Adjust for MINIMUM deflection.
2.	"	"	"	41.25MC	"	"	A2	"
3.	"	"	"	47.25MC	"	"	A3	"
4.	"	High side to pin 1 (grid) of 2nd. Video IF Amp. tube (V4). Low side to chassis.	44MC (10MC Swp)	43.7MC	"	Vert. Amp. to pin 2 (grid) of 12BY7 (V7). Low side to chassis.	A4	If sweep generator has no built-in marker, couple separate marker generator loosely to sweep generator output. Shunt both R40 and R44 with a 300Ω carbon resistor. Attenuate sweep generator output to produce ½ volt peak to peak on scope. Adjust A4 for maximum amplitude with 43.7MC marker on peak of curve.
5.	"	"	"	45.0MC	"	"	A5	Remove 300Ω resistor from across R44. Leave 300Ω resistor across R40 as in step 4. Connect a 300Ω carbon resistor across terminals "A" and "F" of video detector assembly (M8). Adjust A5 for maximum amplitude with 45.0MC marker on peak of curve.
6.	"	"	"	41.8MC	"	"	A6	Remove 300Ω resistor from across R40. Connect 300Ω carbon resistor across R44. Leave 300Ω resistor connected across terminals "A" and "F" of M8 as in step 5. Adjust A6 for maximum amplitude with 41.8MC marker on peak of curve.
7.	.001MFD	High side to pin 1 (grid) of first video IF amplifier tube (V3). Low side to chassis.	44MC (10MC Swp)	41.25MC 42.0MC 45.75MC 47.25MC	Any	Vert. Amp. to pin 2 (grid) of 12BY7 (V7). Low side to chassis.	A7, A8	Adjust for -1.0 volt bias at ungrounded side of C34. Shunt R40, R44 and terminals "A" and "F" of video detector assembly (M8) each with a 300Ω carbon resistor. Loosely couple marker generator to sweep generator output. Adjust A7 and A8 for maximum amplitude and response curve similar to Fig. 1.
8.	Direct	High side to pin 2 (grid) of mixer-osc. tube (V2). Low side to chassis. Use very short leads. Replace shield over V2.	42.5MC (10MC Swp)	41.25MC 41.9MC 44.5MC 45.75MC		Vert. Amp. thru detector (Fig.4) to terminal "B" of L8. Use short leads. Low side to chassis near L8.	A9, A10, A11	Shunt R40, R44 and terminals "A" and "F" of video detector assembly (M8) each with a 300Ω carbon resistor. Connect a 180Ω carbon resistor from terminal "B" of L8 to junction of R31 and R41. Connect high side of marker generator to junction of R34 and R35. Low side to chassis. Preset A9 maximum clockwise. Adjust A10 and A-11 for maximum amplitude and symmetry similar to Fig. 2. Adjust A9 counter clockwise to place 45.75MC marker at 70% on response curve (Fig.2) with 44.5MC marker on peak of high frequency side and 41.9MC at peak on low frequency side. The two peaks should be of equal amplitude as in Fig. 2. Remove 300Ω resistors from across R40, R44 and terminals "A" and "F" of M8. Remove 180Ω from terminal "B" of L8 and junction of R31 and R41.
9.	Direct	High side to an ungrounded tube shield floating over dummy converter tube. Low side to chassis. (Use short leads).	44MC (10MC Swp)	42.25MC 42.5MC 45.0MC 45.75MC 46.5MC	Any	Vert. Amp. to pin 2 (grid) of 12BY7 (V7). Low side to chassis.		Attenuate sweep generator output for approximately 3 volts peak to peak on scope. Check for response curve similar to Fig. 3. If necessary, SLIGHTLY retouch A4 and A5 for desired response. A4 affects tilt. A5 affects the high frequency side of response curve. A6 should not be readjusted. Replace original 6U8 (V2) in its socket. Replace V20 in its socket. Remove all test equipment.

4.5MC TRAP ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
10.	100Ω Resistor	High side to point Ⓔ. Low side to chassis.	4.5MC (Unmod)	Any	DC probe thru detector (Fig.4) to pin 11 (cathode) of picture tube. Common to chassis.	A16, A17	Short pin 1 of V6 to chassis. Adjust for MINIMUM deflection. Remove short from pin 1 of V6.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
11.	.01MFD	High side thru .01MFD to point Ⓔ. Low side to chassis.	4.5MC (Unmod)	Any non-interfering channel	DC probe to point Ⓒ. Common to chassis.	A12, A14, A15	Preset the ratio detector balance control (R9) at its center range position. Adjust A12, A14 and A15 for maximum deflection. Attenuate signal generator output for not more than -10 volts at VTVM. Repeat adjustments until no change in readings are noted.
12.	"	"	"	"	DC probe to point Ⓓ. Common to chassis.	A13, R9	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting. If unable to obtain zero reading at point Ⓓ, by adjusting A13. SLIGHTLY adjust R9 for MINIMUM, then repeat A13 adjustment.

ALIGNMENT INSTRUCTIONS (cont)

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60% modulation and 450KC sweep. Use 120% sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
11.	.01MFD	High side thru .01MFD to point (E). Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any non-interfering channel	Vert. Amp. to point (C). Low side to chassis.	A12, A14, A15	Disconnect stabilizing capacitor (C3). Use only enough sweep generator output to provide usable indication on scope. Adjust A12, A14 and A15 for maximum amplitude and symmetry similar to Fig. 5.
12.	"	"	"	"	"	Vert. Amp. to point (D). Low side to chassis.	A13, R9	Reconnect C3. Preset the ratio detector balance control (R9) at its center range position. Adjust so that 4.5MC occurs at center of crossover lines as in Fig. 6. SLIGHTLY retouch A12 for maximum amplitude and straightness of crossover lines. Connect VTVM to point (D) and chassis. If a reading of more than ±1 volt is obtained, adjust R9 for zero reading on VTVM. Readjust A13 for curve similar to Fig. 6.

OSCILLATOR ALIGNMENT

Complete oscillator alignment may not be necessary. If the oscillator seems to be off frequency approximately the same amount for a majority of the channels it may be possible to correct them in one step using A18. It should be noted that this is an all channel oscillator adjustment and should not be used to correct any individual channel. If adjustment of A18 will not bring all channels well within the range of the fine tuning control it will be necessary to adjust the channel strip adjustment screw for each channel that is off frequency. The channel oscillator adjustment screws are reached thru a hole just to the left of the channel switch shaft.
The correct adjustment screw is accessible thru this hole as the channel switch is turned to each channel.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
13.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. to pin 2 (grid) of 12BY7 (V7). Low side to chassis.	A19	Adjust to place sound marker in trap notch as in Fig. 7. Video marker should be at 50%.
			207MC (10MC Swp)	205.25MC 209.75MC	12		A20	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A21	
			195MC (10MC Swp)	193.25MC 197.75MC	10		A22	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A23	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A24	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A25	
			85MC (10MC Swp)	83.25MC 87.75MC	6		A26	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A27	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A28	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A29	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A30	

RF MIXER ALIGNMENT

This portion of the receiver is very stable. Normally, re-alignment of this portion should not be required.

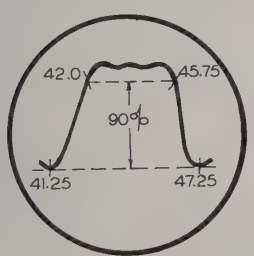

FIG. 1

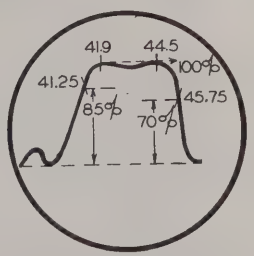

FIG. 2

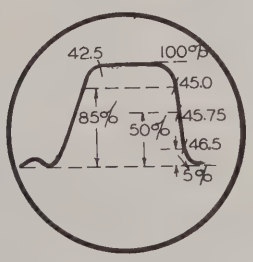

FIG. 3

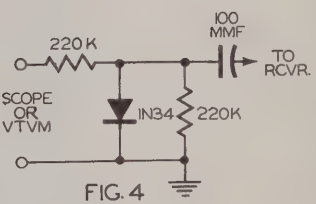

FIG. 4

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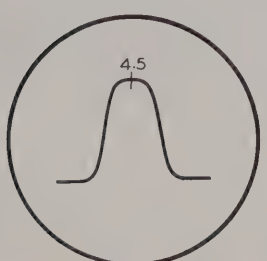


FIG. 5

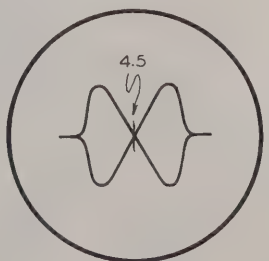


FIG. 6

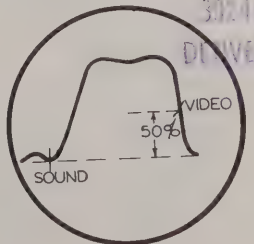
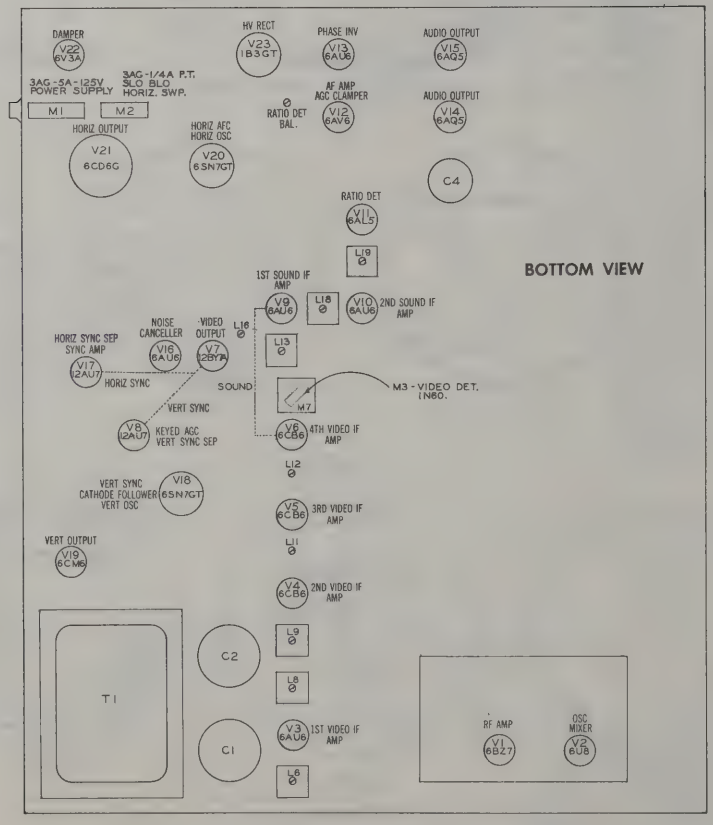


FIG. 7

RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BZ7	†6.2KΩ	330KΩ	INF	0Ω	.1Ω	INF	600KΩ	0Ω	0Ω
V 2	6U8	†6KΩ	200KΩ	†100KΩ	.1Ω	0Ω	†13KΩ	0Ω	0Ω	10KΩ
V 3	6AU6	80KΩ	0Ω	0Ω	.1Ω	†30KΩ	†34KΩ	100Ω		
V 4	6CB6	80KΩ	56Ω	0Ω	.1Ω	†2KΩ	†34KΩ	0Ω		
V 5	6CB6	.2Ω	68Ω	0Ω	.1Ω	†4KΩ	†12KΩ	0Ω		
V 6	6CB6	.2Ω	180Ω	0Ω	.1Ω	†8KΩ	†8KΩ	0Ω		
V 7	12BY7A	80Ω	470KΩ	80Ω	.1Ω	.1Ω	0Ω	†6KΩ	†2.7KΩ	80Ω
V 8	12AU7	350KΩ	4Meg	†2.7KΩ	.1Ω	.1Ω	†680KΩ	4.7Meg	0Ω	0Ω
V 9	6AU6	470KΩ	0Ω	0Ω	.1Ω	†3.7KΩ	†3.7KΩ	82Ω		
V 10	6AU6	47KΩ	0Ω	0Ω	.1Ω	†3.7KΩ	†25KΩ	0Ω		
V 11	6AL5	8KΩ	8KΩ	0Ω	.1Ω	INF	0Ω	INF		
V 12	6AV6	4.7Meg	0Ω	0Ω	.1Ω	550KΩ	550KΩ	†330KΩ		
V 13	6AV6	33KΩ	1.5KΩ	0Ω	.1Ω	NC	NC	†330KΩ		
V 14	6AQ5	500KΩ	180Ω	.1Ω	0Ω	†1.8KΩ	†1.5KΩ	500KΩ		
V 15	6AQ5	500KΩ	180Ω	.1Ω	0Ω	†1.8KΩ	†1.5KΩ	500KΩ		
V 16	6AU6	1.5KΩ	0Ω	0Ω	.1Ω	†16KΩ	†2.7KΩ	39Ω		
V 17	12AU7	†6.8KΩ	50KΩ	420KΩ	.1Ω	.1Ω	†12KΩ	70KΩ	0Ω	0Ω
V 18	6SN7GT	1.2Meg	†37KΩ	15KΩ	1.8Meg	▲2Meg	140Ω	0Ω	.1Ω	
V 19	6CM6	†1KΩ	TP	2.2Meg	0Ω	.1Ω	2.2Meg	600Ω	NC	†1.2KΩ
V 20	6SN7GT	1.5Meg	†40KΩ	400KΩ	500KΩ	†68KΩ	0Ω	0Ω	.1Ω	
V 21	6CD6G	NC	.1Ω	235Ω	TP	470KΩ	TP	0Ω	†19KΩ	TOP CAP ▲10.6Ω
V 22	6V3A	NC	†60Ω	NC	.1Ω	0Ω	NC	†60Ω	NC	†60Ω TOP CAP 850KΩ
V 23	1B3GT		PINS	1 - 8	HAVE	INF	RESISTANCE			TOP CAP ▲500Ω
V 24	5U4G	NC	10KΩ	NC	19Ω	NC	21Ω	NC	10KΩ	
V 25	5U4G	NC	10KΩ	NC	19Ω	NC	21Ω	NC	10KΩ	
V 26	21ACP4A/ 21AMP4A	0Ω	†300KΩ	PIN 10 †42Ω	PIN 11 †240KΩ	PIN 12 .1Ω				

† MEASURED FROM PIN 2 OF V24.
▲ MEASURED FROM TOP CAP OF V22.
NC- NO CONNECTION
TP - TIE POINT



TUBE PLACEMENT CHART

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		ATR PART No.	STANDARD REPLACEMENT		
V1	RF Amplifier	6BZ7	6BZ7	9AJ	6BQ7 or 6BK7 used as an alternate
V2	Mixer-Osc.	6U8	6U8	9AE	
V3	1st. Video IF Amp.	6AU6	6AU6	7BK	
V4	2nd. Video IF Amp.	6CB6	6CB6	7CM	
V5	3rd. Video IF Amp.	6CB6	6CB6	7CM	
V6	4th. Video IF Amp.	6CB6	6CB6	7CM	
V7	Video Output	12BY7A	12BY7A	9BF	12BY7 used as an alternate
V8	AGC Keying-Vert. Sync Sep.	12AU7	12AU7	9A	
V9	1st. Sound IF Amp.	6AU6	6AU6	7BK	
V10	2nd. Sound IF Amp.	6AU6	6AU6	7BK	
V11	Ratio Detector	6AL5	6AL5	6BT	
V12	AF Amplifier-AGC Clamper	6AV6	6AV6	7BT	
V13	Phase Inverter	6AV6	6AV6	7BT	
V14	Audio Output	6AQ5	6AQ5	7BZ	
V15	Audio Output	6AQ5	6AQ5	7BZ	
V16	Noise Canceller	6AU6	6AU6	7BK	
V17	Horiz. Sync Sep.-Sync Amplifier	12AU7	12AU7	9A	
V18	Vert. Sync Cathode Follower-Vert. Oscillator	6SN7GT	6SN7GT	8BD	
V19	Vert. Output	6CM6	6CM6	9CK	
V20	Horiz. AFC-Horiz. Osc.	6SN7GT	6SN7GT	8BD	
V21	Horiz. Output	6CD6G	6CD6G	5BT	
V22	Damper	6V3A	6V3A	9BD	6V3 used as an alternate
V23	HV Rectifier	1B3GT	1B3GT	3C	
V24	LV Rectifier	5U4G	5U4G	5T	
V25	LV Rectifier	5U4G	5U4G	5T	

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA					RETMA BASE TYPE	NOTES
	ATR PART No.	CBS PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.		
V26	21ACP4A/21AMP4A ①	21AMP4A ①	21ACP4A / 21AMP4A ①	21AMP4A ② 21AMP4 21ACP4A ② 21ACP4	21AMP4A	12N 12N 12N 12N	① Aluminized ② Silver screen

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	ATR PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	◓50	400	ZMP-374			FP431.7	TM-4025	Q-415	
B	■40	400				TC78	TD-40-450	FM-4540	
C	▲35	400							
D	100	50							
C2A	◓90	400	ZMP-373	AFH4-07	CO37	FP450	TM-4046	Q-025	TVL-4680
B	▲10	400				TC77	TD-10-450		
C	■25	400							
D	10	400							
C3	5	50	C112	SRE50V5	BBR550	TC30	TD-5-50	MMT-0505	TVA-1303
C4A	10	25	ZMP-375			FP231	TM-2008	D-200	
B	■10	400				TC36	TD-25-50	MT-0525	
C	▲20	50							
C5	10	50	C302	SRE50V10	BR105	TC32	TD-10-50	FM-0510	TVA-1304
C6	5	450	C507	PRS450V8	BR845	TC70	TD-8-450	FM-4508	TVA-1704
C7	10	350	C618	PRS350V10	BR1235	TC62	TD-12-350	FM-3512	TVA-1604

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	ATR PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C8	3-8				829-10					
C9	1000			BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C10	3			NP0-D13	TCZ-3R3	Z007	NP0A-030	ZT-553	5TCCB-V33	
C11	.5-3				829-3		3115-01-0R5	CT565A		
C12	800									
C13	47			BPD-000047	DD-470	G033	831-470	UC-5447	5GA-Q47	
C14	1.5			NP0-S11.5	TCZ-1R5	TZ04	NP0A-1R5	ZT-5515	5TCCB-V15	
C15	800									
C16	47			EF-00005	MFT-50					
C17	.5-3				829-3		3115-01-0R5	CT565A		
C18	10									
C19	5									
C20	1-4				829-4		3115-01-10	CT551		
C21	1000			BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C22	800									
C23	220			BPD-00022	DD-221	G051	811-221	UC-5322	5GA-T22	
C24	68			N750-D168	TCN-68	N038	N750L-680		5TCU-Q68	
C25	800									
C26	4700		C229	BPD-0047	DD-472	K079	811-0047	DC-525	5HK-D47	
C27	4700		C909	BPD-0047	DD-472	K079	811-0047	DC-525	5HK-D47	
C28	4700		C712	BPD-0047	DD-472	K079	811-0047	DC-525	5HK-D47	
C29	10000		C230	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C30	.22	200	C705	P288N-22		CUB2P22		PT4022	2TM-P22	
C31	.22	200	C704	P288N-22		CUB2P22		PT4022	2TM-P22	
C32	220		C702	BPD-00022	DD-221	G051	811-221	UC-5322	5GA-T22	
C33	.22	200	C709	P288N-22		CUB2P22		PT4022	2TM-P22	
C34	.22	200	C710	P288N-22		CUB2P22		PT4022	2TM-P22	
C35	4700		C203	BPD-0047	DD-472	K079	811-0047	DC-525	5HK-D47	
C36	4700		C231	BPD-0047	DD-472	K079	811-0047	DC-525	5HK-D47	
C37	4700		C204	BPD-0047	DD-472	K079	811-0047	DC-525	5HK-D47	

ATR MODELS
26001, 2, 3, 4, 5 (Ch. 2600)

PROPERTY OF

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No.	RATING CAP	RATING VOLT	ATR PART No	ARROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No	SPRAGUE PART No.	NOTES
C38	.1	400	C205	P488N-1	DF-104	CUB4P1		PT401	4TM-P1	
C39	4700		C238	BPD-0047	DD-472	KD7S	811-0047	DC-525	5HK-D47	
C40	4700		C239	BPD-0047	DD-472	KD7S	811-0047	DC-525	5HK-D47	
C41	4700		C206	BPD-0047	DD-472	KD7S	811-0047	DC-525	5HK-D47	
C42	4700		C232	BPD-0047	DD-472	KD7S	811-0047	DC-525	5HK-D47	
C43	4700		C711	BPD-0047	DD-472	KD7S	811-0047	DC-525	5HK-D47	
C44	4700		C211	BPD-0047	DD-472	KD7S	811-0047	DC-525	5HK-D47	
C45	4700		C210	BPD-0047	DD-472	KD7S	811-0047	DC-525	5HK-D47	
C46	4700		C235	BPD-0047	DD-472	KD7S	811-0047	DC-525	5HK-D47	
C47	10000		C227	BPD-01	DD-103	KD8S	811-01	DC-511	5HK-S1	
C48	4700		C215	BPD-0047	DD-472	KD7S	811-0047	DC-525	5HK-D47	
C49	4700		C212	BPD-0047	DD-472	KD7S	811-0047	DC-525	5HK-D47	
C50	4700		C234	BPD-0047	DD-472	KD7S	811-0047	DC-525	5HK-D47	
C51	10000		C228	BPD-01	DD-103	KD8S	811-01	DC-511	5HK-S1	
C52	1500		C217	BPD-0015	DD-153	KT7I	801-0015	DC-5315	5HK-D15	
C53	4700		C218	BPD-0047	DD-472	KD7S	811-0047	DC-525	5HK-D47	
C54	4700		C214	BPD-0047	DD-472	KD7S	811-0047	DC-525	5HK-D47	
C55	4700		C233	BPD-0047	DD-472	KD7S	811-0047	DC-525	5HK-D47	
C56	10000		C208	BPD-01	DD-103	KD8S	811-01	DC-511	5HK-S1	
C57	10000		C219	BPD-01	DD-103	KD8S	811-01	DC-511	5HK-S1	
C58	10000		C223	BPD-01	DD-103	KD8S	811-01	DC-511	5HK-S1	
C59	.1	400	C204	P488N-1	DF-104	CUB4P1		PT401	4TM-P1	
C60	.001	1000	C205	BPD-01-001	DD-103	CUB1ED1	BR5KV-102	PT631	10TM-D1	
C61	4.7		C201	WPG-S1R7	T2S7	T2S7	MPGA-4R7	T2S7	5TCC-Q47	
C62	.22	600	C203	P688N-22		CUB6P223		PT6232	6TM-P22	
C63	.0022	600	C213	BPD-0022	DS-222	CUB4D222	GP2-333-222	PT6222	6TM-D22	
C64	.22	400	C203	P488N-22		CUB4P223		PT4232	4TM-P22	
C65	.0027	600	C703	DI-0027	DS-272	KD7S	GP2-333-272	UC-5327	5QA-D27	
C66	10000		C102	BPD-01	DD-103	KD8S	811-01	DC-511	5HK-S1	
C67	10000		C101	BPD-01	DD-103	KD8S	811-01	DC-511	5HK-S1	
C68	.56		C105	NT5G-5156	TC5-56	TN56	NT50K-560		5TCU-Q56	
C69	10000		C107	BPD-01	DD-103	KD8S	811-01	DC-511	5HK-S1	
C70	10000		C106	BPD-01	DD-103	KD8S	811-01	DC-511	5HK-S1	
C71	470	500	C110	E470	DE-471	SW5Y47	GP3K-471	MC345	1FM-347	
C72	470	500	C111	E470	DE-471	SW5Y47	GP3K-471	MC345	1FM-347	
C73	0022	400	C113	EI3200	DE-332	CUB4D22	GP2-333-232	PT6232	6TM-D22	
C74	.01	400	C114	EI3200	DE-103	CUB4E1	GP3-333-103	PT611	6TM-E1	
C75	.033	400	C115	BPD-03	DF-303	CUB4E33		PT633	6TM-E33	
C76	.01	400	C116	BPD-01	DE-103	CUB4E1	GP3-333-103	PT611	6TM-E1	
C77	.1	400	C117	P488N-1	DF-104	CUB4P1		PT401	4TM-P1	
C78	470	500	C125	E470	DE-471	SW5Y47	GP3K-471	MC345	1FM-347	
C79	.0015	400	C122	EI3500	DE-152	CUB6D15	GP2L-152	PT6215	6TM-D15	
C80	.01	600	C119	BPD-01	DE-103	CUB6E1	GP3-333-103	PT611	6TM-E1	
C81	.0022	600	C123	EI3200	DE-232	CUB6D22	GP2-333-222	PT6222	6TM-D22	
C82	.0022	600	C124	SI2200	DE-222	CUB6D22	GP2-333-222	PT6222	6TM-D22	
C83	.0068	600	C108	BPD-0068	DE-682	CUB6D68	GP3-333-682		6TM-D68	
C84	.0082	600	C706							
C85	.0047	600	C707	BPD-0047	DE-472	CUB6D47	GP2-333-472	PT6247	6TM-D47	
C86	270		C405	SI270	DE-271	TP6L	GP3K-271	UC-5327	5QA-T27	
C87	330	500	C401	EI330	DE-331	TP6S	GP3K-331	UC-5333	5TM-S33	
C88	.047	400	C403	BPD-05	DF-503	CUB4E47		PT6147	6TM-E47	
C89	270	500	C402	SI270	DE-271	SW5Y27	GP3K-271	MC345	1FM-347	
C90	.033	400	C404	BPD-03	DF-303	CUB6E33		PT6133	6TM-S33	
C91	.01	600	C407	BPD-01	DE-103	CUB6E1	GP3-333-103	PT611	6TM-E1	
C92	100		C409	N750-S1100	TC5N-100	TN5L		NT5L-101	NT-531	5TCU-T1
C93	100		C501	N750-S1100	TC5N-100	TN22		N750L-101	NT-531	5TCU-T1
C94	100		C502	N750-S1100	TC5N-100	TN22		N750L-101	NT-531	5TCU-T1
C95	.0047	600	C503	BPD-0047	DE-472	CUB6D47	GP2-333-472	PT6247	6TM-D47	
C96	.1	600	C504	P688N-1	DF-104	CUB6P1		PT601	6TM-P1	
C97	.18	200	C506							
C98	.047	600	C505	BPD-08	DF-503	CUB6E47		PT6147	6TM-S47	
C99	.027	1000	C509							
C100	.001	1000	C508	HVD-15-001	DD-102	CUB1ED1	BR5KV-102	PT631	10TM-D1	
C101	.022	400	C801	BPD-02	DF-303	CUB4E22	817-01	PT6123	6TM-E22	
C102	.1	400	C702	P488N-1	DF-104	CUB4P1		PT401	4TM-P1	
C103	.0047	600	C804	BPD-0047	DE-472	CUB4D47	GP2-333-472	PT6247	6TM-D47	
C104	.1	600	C802	P688N-1	DF-104	CUB6P1		PT601	6TM-P1	
C105	.0047	600	C402	BPD-0047	DE-472	CUB4D47	GP2-333-472	PT6247	6TM-D47	
C106	120		C408	N750-S1120	TC5N-120	TN24	N750L-121		5TCU-T12	
C107	82	500	C601	SI82	DE-820	SW5Q82	GP3K-820		1FM-482	
C108	.047	600	C602	BPD-05	DF-503	CUB6E47		PT6147	6TM-S47	
C109	82	500	C609	SI82	DE-820	SW5Q82	GP3K-820		1FM-482	
C110	.047	400	C604	BPD-05	DF-503	CUB4E47		PT6147	4TM-S47	
C111	.022	400	C605	BPD-02	DF-303	CUB4E22	817-01	PT6123	6TM-E22	
C112	.47	200	C606	SI2P47		SW2P47		PT4047	2TM-P47	
C113	270	500	C607	SI270	DE-271	SW5Y27	811-271	MC3241	1FM-327	
C114	.01	600	C608	BPD-01	DE-103	CUB6E1	GP3-333-103	PT611	6TM-E1	
C115	.0012	1000	C618							
C116	.001	1000	C610	HVD-15-001	DD-102	CUB1ED1	BR5KV-102	PT631	10TM-D1	
C117	.047	400	C614	BPD-05	DF-503	CUB4E47		PT6147	6TM-S47	
C118	.47	200	C613	P288-47		CUB2P47		PT4047	2TM-P47	
C119	.047	600	C612	BPD-05	DF-503	CUB6E47		PT6147	6TM-S47	
C120	.047	600	C617	BPD-05	DF-503	CUB6E47		PT6147	6TM-S47	
C121	47	3000	C701	HVD-30-47	DD30-470	VSQ47	3KV-470	DC30447	30CA-Q47	
C122	.22	500	C705	P288N-22		CUB2P47		PT4023	2TM-P23	
C123	500	30000	ZMP-396	UV-503	TV5-503	MMU30T5	416		30DK-T5	
C124	100	3000	C521	HVD-30-0001	DD30-101	V2T1	3KV-101	DC3031	30CA-T1	
C125	.01	600	C801	BPD-01	DE-103	CUB6E1	GP3-333-103	PT611	6TM-E1	
C126	.01	600	C803	BPD-01	DE-103	CUB6E1	GP3-333-103	PT611	6TM-S1	
C127	1.0	150	C127	P288N-1.0		CUB2W1		PT41	2TM-M1	

CONTROLS

ITEM No	RATING RESISTANCE	RATING WATTS	ATR PART No	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	200KΩ	½	ZMP-396	F1-53			UF-354A	Brightness (Panel)
B	1Meg	½		RS-57			UR1R-1751	Volume Tap at 200KΩ (Rear)
C	Switch			KS-3			US-27	Attach to R1B.
R2A	250KΩ	½	ZMP-401	AB-51	A49-250K-Z	Q13-130 ✱	U-56 ✱	Tone
B	Shaft		Not Req.	AK-4	KS8-5	Not Req.	Not Req.	Attach to R2A.
R3A	75KΩ	½		AB-35	A47-75K-S	Q11-125 ✱		Horizontal Hold
B	Shaft			AK-4	KS8-5	Not Req.		Attach to R3A.
R4	250Ω	2	R304					Contrast
R5A	1Meg	½	R505	AB-69	A47-1Meg-S	Q11-137 ✱	U-54 ✱	Vertical Hold
B	Shaft		Not Req.	AK-4	KS8-5	Not Req.	Not Req.	Attach to R5A.
R6	2.5Meg	½	R507	BX-83	A47-2.5Meg-S	Q11-338	TA358L	Vertical Size
B	Shaft		Not Req.	Not Req.	FK8-½	Not Req.	Not Req.	Attach to R6A.
R7A	2000Ω	2	ZMP-408	YK-131	A43-2000	WK-2000	R2500L	Vertical Linearity (Wire Wound)
B	Shaft		Not Req.	Not Req.	FK8-½	Not Req.	Not Req.	Attach to R7A.
R8A	10KΩ	½	R701	BX-48	A43-10K-S	Q11-230	U-63	AGC
B	Shaft		Not Req.	Not Req.	FK8-½	Not Req.	Not Req.	Attach to R8A.
R9A	2000Ω	½	R518	AB-6	A43-2000-S	Q11-110	U-6	Ratio Detector Balance
B	Shaft		Not Req.	AK-1	FK8-½	Not Req.	Not Req.	Attach to R9A.

✱ Mount control on chassis (rear panel, not on bracket.
† Universal Replacement (Mallory Exact Duplicate Part No. U512888)

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA ATR PART No.	REPLACEMENT DATA IRC PART No.	NOTES
R10	47KΩ	1			
R11	22KΩ	½		BTS-22K	
R12	470KΩ	½			
R13	330KΩ	½			
R14	1500Ω	1		BTA-1500	
R15	10KΩ	½			
R16	33KΩ	1		BTA-3300	
R17	6800Ω	1		BTS-6800	
R18	100KΩ	½			
R19	100KΩ	½			
R20	100KΩ	½			
R21	330Ω	1		BTS-8300	
R22	4700Ω	3	R707	BTS-4700	
R23	3.3Meg 5%	1	R707	BTA-3.3Meg 5%	
R24	10KΩ	½	R706	BTS-10K	
R25	270KΩ 5%	½	R705	BTS-270K 5%	
R26	270KΩ 5%	½	R708	BTS-270K 5%	
R27	10KΩ	½	R709	BTS-10K	
R28	100Ω	½	R302	BTS-100	
R29	1000Ω	½	R303	BTS-1000	
R30	33KΩ	½	R305		
R31	1000Ω	½	R307	BTS-1000	
R32	100Ω 5%	½	R304	BTS-100 5%	
R33	375Ω	½	R334		
R34	82KΩ 5%	½	R710	BTS-83K 5%	
R35	100KΩ	½	R308	BTS-1000	
R36	33KΩ	½	R306		
R37	33KΩ	½	R311		
R38	1000Ω	½	R312	BTS-1000	
R39	5Ω 5%	½	R310	BTS-56 5%	
R40	56000Ω 5%	½	R313		
R41	10KΩ	½	R315		
R42	2200Ω	½	R316	BTS-2200	
R43	680Ω 5%	½	R314	BTS-68 5%	
R44	56KΩ 5%	½	R317		
R45	820KΩ	½	R319		
R46	18KΩ	½	R321		
R47	5600Ω	½	R322		
R48	56KΩ	½	R320	BTS-180	
R49	470KΩ	½	R323		
R50	2500Ω	½	R502		
R51	47000Ω	½	R301		
R52	470KΩ	½	R313		
R53	18KΩ	½	R305		
R54	10KΩ	2	R307		
R55	10KΩ	2	R308		
R56	18KΩ	2	R309		
R57	3200Ω	3	R310		
R58	33Ω	½	R314	BTS-33	
R59	27KΩ	½	R803		
R60	150KΩ	½	R804		
R61	820KΩ	½	R805		
R62	680KΩ	½	R31		
R63	100KΩ	½	R32		
R64	100KΩ	½	R704		
R65	1000Ω	½	R102	BTS-1000	
R66	820 5%	½	R101	BTS-83 5%	
R67	470KΩ	½	R103	BTS-47K	
R68	56KΩ	½	R104	BTS-56K	
R69	33KΩ	½	R105	BTS-33K	
R70	1000Ω	½	R106	BTS-1000	
R71	470Ω	½	R107	BTS-47	
R72	1000Ω	½	R111	BTS-1000	
R73	68000 5%	½	R109	BTS-6800 5%	
R74	6800Ω 5%	½	R110	BTS-6800 5%	
R75	39KΩ	½	R112	BTS-39K	
R76	18KΩ	½	R115	BTS-18K	
R77	4.7Meg	½	R114	BTS-4.7Meg	
R78	330KΩ	½	R117	BTS-330K	
R79	220KΩ	½	R116	BTS-220K	
R80	33KΩ	½	R121	BTS-33K	
R81	330KΩ	½	R118	BTS-330K	

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA ATR PART No.	REPLACEMENT DATA IRC PART No.	NOTES
R82	1500Ω	½	R119	BTS-1500	
R83	470KΩ	½	R120	BTS-470K	
R84	47Ω	½	R122	BTS-47	
R85	470KΩ	½	R125	BTS-470K	
R86	47Ω	½	R123	BTS-47	
R87	1500Ω	10	R128	13/4A-1500	
R88	180Ω	3	R124		
R89	1800Ω	½	R303		
R90	15KΩ	½	R402		
R91	39Ω	½	R401		
R92	270KΩ	½	R408		
R93	27KΩ	½	R407		
R94	27KΩ	½	R410		
R95	680Ω	½	R411		
R96	5.6Meg	½	R702		
R97	220KΩ	½	R703		
R98	4.7Meg	½	R408		
R99	470KΩ	½	R409		
R100	680KΩ	½	R403		
R101	39KΩ	½	R604		
R102	1Meg	½	R605		
R103	332KΩ	½	R606		
R104	820KΩ	1	R412		
R105	1500 5%	½	R413		
R106	1Meg	½	R414		
R107	220KΩ	½	R415		
R108	33KΩ	½	R416		
R109	100KΩ	½	R417		
R110	15KΩ	½	R503		
R111	470KΩ	½	R504		
R112	470KΩ	½	R501		
R113	1Meg	½	R204		
R114	330Ω	½	R205		
R115	470KΩ	½	R511		
R116	820KΩ	½	R508		
R117	82KΩ	½	R509		
R118	33KΩ 5%	2	R510		
R119	2.2Meg	½	R512		
R120	100Ω	½	R518		
R121	470KΩ	½	R515		
R122	10KΩ	½	R516		
R123	330Ω	½	R801		
R124	560Ω	½	R517	BTS-560	
R125	56Ω	½	R518	BTS-560	
R126	1500Ω	½	R604		
R127	820KΩ	½	R605		
R128	27KΩ	½	R601		
R129	68KΩ	½	R603		
R130	68KΩ	½	R606		
R131	3300Ω	½	R607		
R132	390Ω	½	R608		
R133	150KΩ	½	R609		
R134	2800Ω	½	R611		
R135	150KΩ 5%	½	R610		
R136	47KΩ	½	R612		
R137	68KΩ	½	R617		
R138	470KΩ	½	R613		
R139	100Ω	½	R614		
R140	100Ω	½	R619		
R141	39KΩ	2	R620		
R142	68KΩ	2	R621		
R143	470Ω	2	R615		
R144	470Ω	2	R616		
R145	10KΩ	½	R623		
R146	2.2Ω	½	R622	BW1-2.2	
R147	220KΩ	½	R624	BTA-220K	
R148	500Ω	15	R902	1 3/4A-225	
R149	500Ω	15	R903	2D-250	
R150/A	730Ω	7	R904	1 3/4A-750	
B	1050Ω	4	R905	1 3/4A-1050	
C	2100Ω	5	R906	1 3/4A-2K	
R151	100KΩ	½	R901	BTA-100K	
R152	80Ω	1	R520		

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	REPLACEMENT DATA ATR PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC	660VCT	5VAC	6.3VAC	ZMP-391					
	@ 2.84A	. 410ADC	6A	@ 11.5A						

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	ATR PART No.	Halldorson PART No.	Merit PART No.	RCA TYPE No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T2	Vert. Osc. Trans.	ZMP-397	B8702 ①	A-3003 ②	209T1 ①②	V405 ①	A-8125 ①	26A03 ①	A-97X ①
T3	Horiz. Output Trans.	ZMP-398	F3618 *	HVO-36 *	213T1 *	X094 *	A-8253 *	F1L7-1B *	D-50 *
T4	Vert. Output Trans.	ZMP-407	Z1900	A-3035	204T2	V301	A-8115	24B98	A-101U
T5A	Yoke(90°)Horiz. (Ω, SMH)	ZMP-398	DF807 ③	MDF-93 ③	235D1 ③		DY-16A ③	Y-16 ③	Y-61-1 ③
B	Vert. (40.5MH)								
T6	Horiz. Lin. Coil (L4 to 11MH)	ZMP-390	RF-800 ③	MWC-8	21R1 ③	20IR15 ③	WC-8	WC-22	WC-12 ③
T7	Width Coil (4 to 30MH)	ZMP-394	RF-800 ③	MWC-10	21R1	20IR10 ③	WC-10	WC-13	WC-11 ③

① Connect as auto transformer.
② Drill new mounting hole(s).
③ Use original horizontal damping network, if necessary.
④ Connect to terminals #3 & #4.
⑤ Connect to coded red & blue terminals.
⑥ Connect to terminals #1 & #2.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
2	H. V. Rect. Lead	H. V. Rect. Lead	H. V. Rect. Lead	H. V. Rect. Lead	H. V. Rect. Lead	H. V. Rect. Lead	H. V. Rect. Lead
3	9	9	9	9	8	9	9
4	7	7	7	7	1	7	7
5	See Note ②	See Note ②	See Note ②	See Note ②	See Note ②	See Note ②	See Note ②
6	3	3	3	3	3	3	3
8	1	1	1	1	4	1	1
11	1	1	1	1	4	1	1
Connect Width Coil Across	1 & 6	1 & 3	1 & 3	1 & 3	3 & 4	1 & 3	1 & 3
Special Notes	①	①	①	①	①	①	①

① Connect R146 in series with C134 across horiz. yoke, terms. #3 and #4.
② If insufficient width, add capacity (approx. 50 to 100MMF ⑤ 4KV Min.) across horizontal yoke.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA ATR PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T8	7.7KΩ CT	2.6Ω	ZMP-364	Z1011	A-2901 ①	A-3830	24S61 ①	S-55X	① Drill one new mtg. hole.

SPEAKER

ITEM No.	RATINGS SIZE	RATINGS FIELD	REPLACEMENT DATA ATR PART No.	REPLACEMENT DATA QUAM PART No.	NOTES
SP1	4"	PM	3.7Ω	4Ω	
SP2	10"	PM	8.2Ω	TOD-291	10Ω6
				TOD-290	

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA ATR PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	Ant. Coils	0Ω	0Ω					
L2	Next. Coil	0Ω						
L3	RF, Mixer Grid, Osc. Coils	0Ω						
L4	Fil. Choke	0Ω						
L5	Coon. Plate	.1Ω						
L6	1st Video IF Plate	.1Ω	.2Ω	ZMP-381			6216	Includes 39.25MC Trap and 5.6KΩ resistor
L7	Fil. Choke	0Ω		ZMP-406	19-1001		4604	1.8 Microhenries
L8	1st Video IF Plate	.1Ω		ZMP-383			6217	Includes 41.25MC Trap and 4.7KΩ resistor, 13MMF and 100MMF caps. Includes 47.25MC Trap and 12MMF cap. 1.8 Microhenries
L9	2nd Video IF	.1Ω		ZMP-385			6218	
L10	Fil. Choke	0Ω		ZMP-406	19-1001		4604	
L11	3rd Video IF	.2Ω	.2Ω	ZMP-376	17-4522	TV-130	6219	
L12	4th Video IF	.2Ω	.2Ω	ZMP-376	17-4523	TV-130	6219	
L13	1st Sound IF			ZMP-379				Tapped @ 5.5Ω
L14	Shunt Peaking Coil	.1Ω		ZMP-404	19-3300	TV-190	6132	330 Microhenries
L15	Series Peaking Coil	6.5Ω		ZMP-403	19-3095	TV-181	6177	95 Microhenries
L16	4.5MC Trap	5.5Ω		ZMP-377	20-1005	TV-161	1470	
L17	Series Peaking Coil	6.5Ω		ZMP-403	19-3093	TV-181	6177	95 Microhenries
L18	2nd Sound IF	3.4Ω	1.9Ω	ZMP-388	18-3445	TV-113 *	6203 *	
L19	Ratio Det.	4.6Ω	.35CT	ZMP-389	17-1035	TV-110	1468	Tertiary Windings, 5Ω

* Use adaptor plate.

TRANSFORMER (HORIZ. OSC.)

ITEM No.	DC RES PRI.	DC RES SEC.	REPLACEMENT DATA ATR PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	RCA TYPE No.	Ram PART No.	Thordarson PART No.	NOTES
L20	23Ω	58Ω	ZMP-390	20-1402	TV-162	6183	205R1		HS-3	Waveform winding 60Ω

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	RATINGS D. C. RESISTANCE	RATINGS INDUCTANCE @ CURRENT 1000 "L"	REPLACEMENT DATA ATR PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L21	.410ADC	41.5Ω	1.9H	ZMP-386					

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA ATR PART No. FUSE	ATR PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
M1	3AG	1/4A 250V			312.250 (3AG P/T 1/4A)		MDV 1/4	
M3	3AG	5A			312005.	342001	MTH5	HKP

PARTS LIST AND DESCRIPTIONS (Continued)

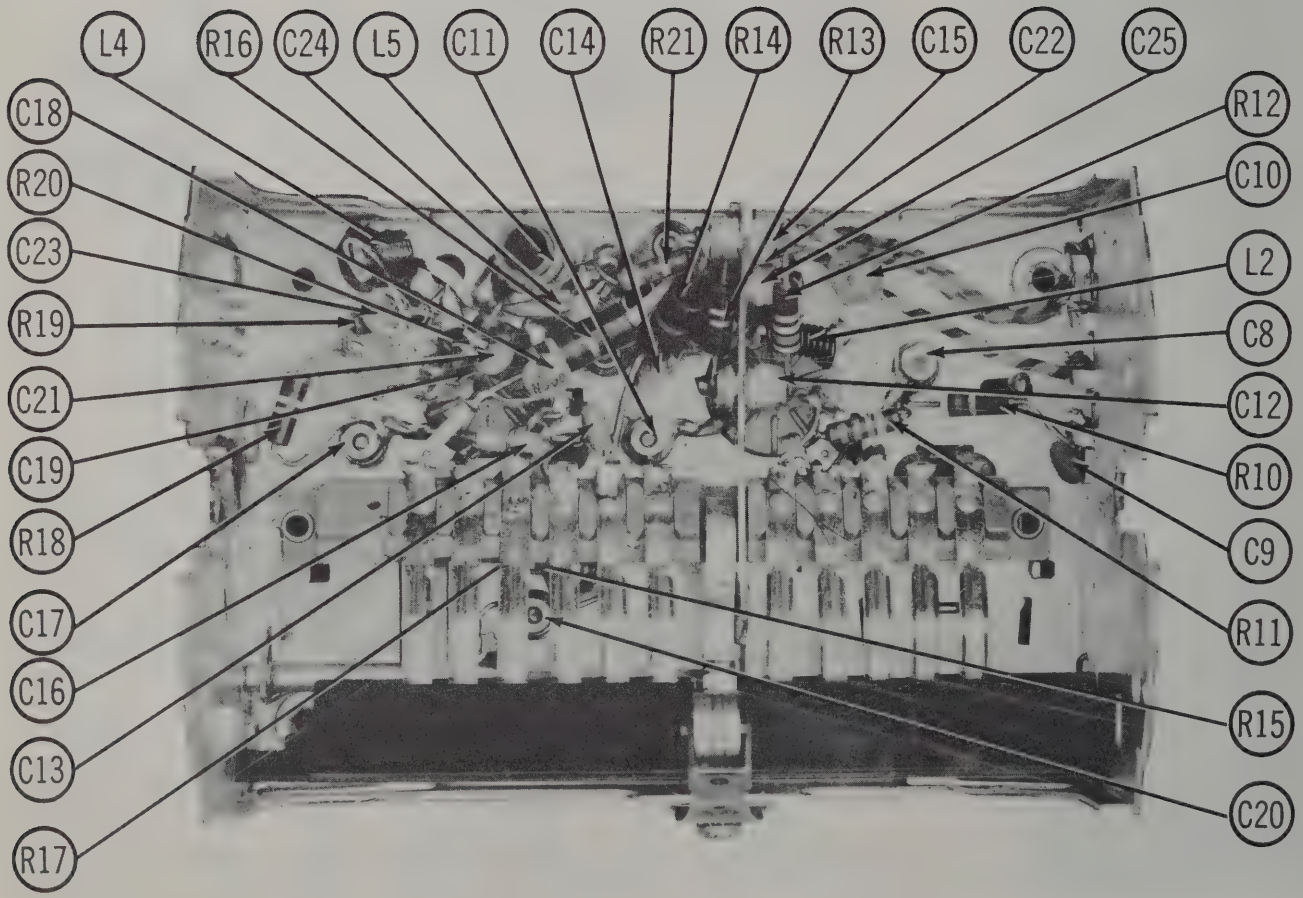
CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA		NOTES
		ATR PART No.	SYLVANIA PART No.	
M3	1N64 *		1N60 or 1N132	Video Det.

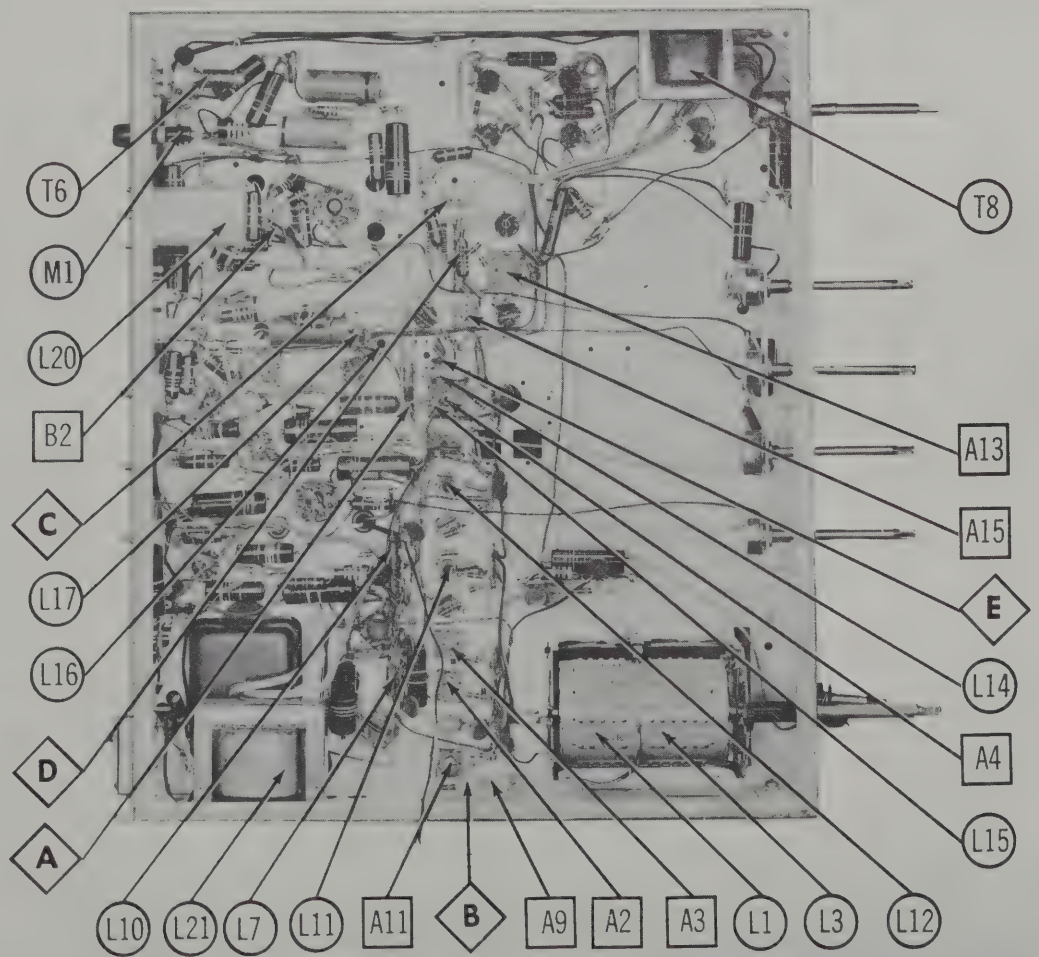
* Some versions may use type 1N60 crystal diode in this application.

MISCELLANEOUS

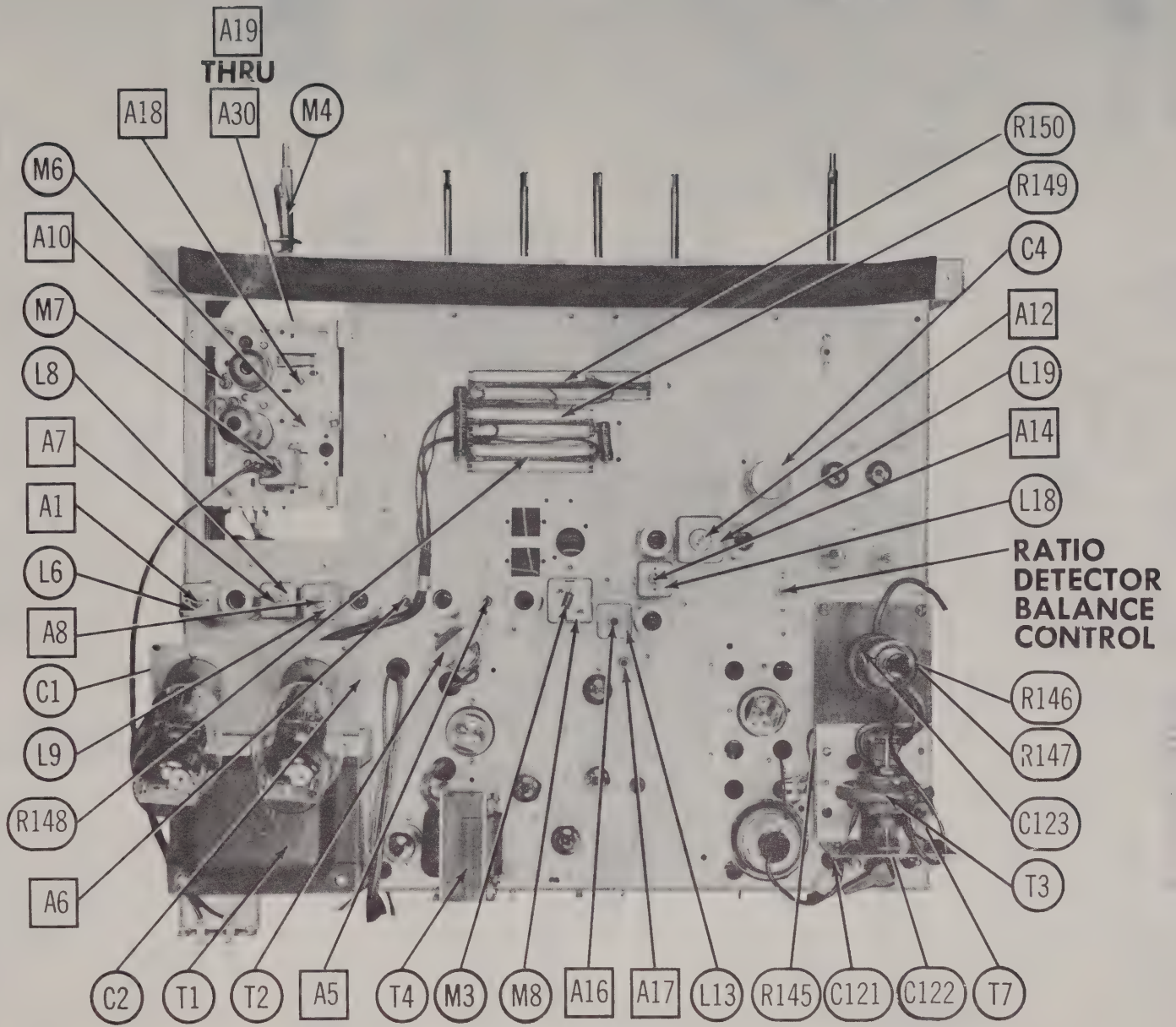
ITEM No.	PART NAME	ATR PART No.	NOTES
M4	Dial Light		#47
M5	Pilot Light		#1815
M6	Tuner		VHF
M7	Trap		VHF Ant. Input Filter
M8	Video Det. Assy.	ZMP-378	Includes M3, coils, capacitors, & resistor
M9	Focus Magnet	YOD-294	Includes centering device
M10	Ion Trap		
A9	Trimmer Cap.		Video IF Input Trimmer
B3,B4	Trimmer Cap.	ZMP-393	2 sections: Horiz. lock (10-160MMF) & horiz. drive (10-160MMF)



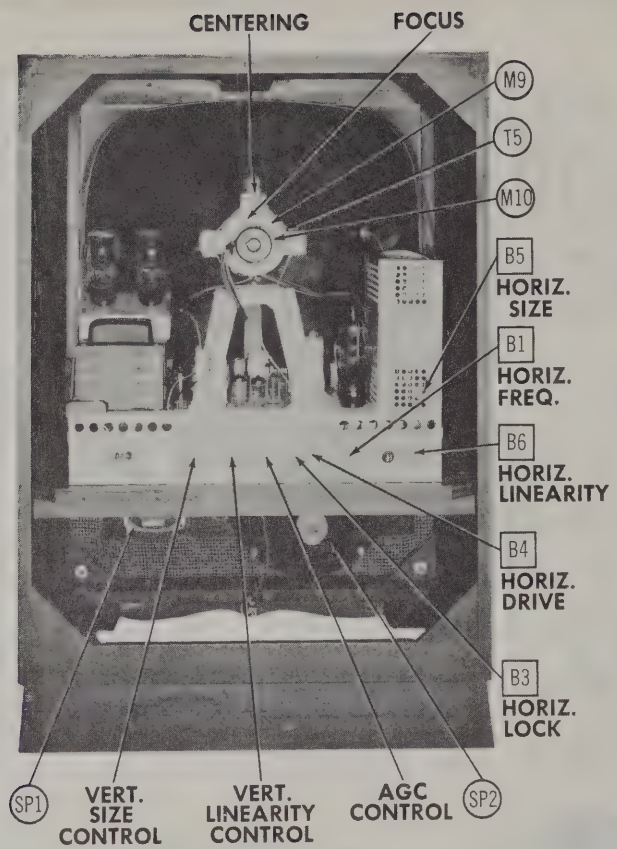
RF TUNER BOTTOM VIEW



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION



CHASSIS TOP VIEW



CABINET—REAR VIEW

3124 ...LADE ST.
DENVER, COLORADO

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Tune in a TV station, preferably a test pattern.

HORIZONTAL FREQUENCY ADJUSTMENT

1. Rotate the horizontal hold control over its entire range. If picture does not remain in sync over most of its range, adjust the horizontal frequency slug (B1) for best sync.

2. If unable to adjust B1 for proper horizontal hold range, adjust the horizontal waveform slug (B2) counter clockwise a few turns and repeat step 1. Picture should remain in sync over the full range of the horizontal hold control; if not, continue with "Horizontal Waveform Adjustment.

HORIZONTAL WAVEFORM ADJUSTMENT

1. Set the horizontal hold control fully clockwise, then back counter clockwise approximately one-quarter turn.

2. Short together terminals "C" and "D" of the horizontal oscillator coil (L20).

3. If necessary, adjust B1 until picture just locks in horizontally.

4. Remove short from terminal "C" and "D" of L20. If picture loses sync adjust the waveform slug (B2) clockwise until picture just falls into sync.

5. Connect the vertical input lead of an oscilloscope thru low capacity probe to terminal "C" of L20. Connect the low side to chassis. Adjust the waveform slug (B2) until the broad and narrow peaks are of equal amplitude as shown in Fig. 8. While adjusting B2 keep the picture in sync by adjusting B1. Disconnect scope from receiver.

HORIZONTAL LOCK ADJUSTMENT

1. Set the horizontal hold control fully counter clockwise switch off channel and back again. Picture should remain in sync.

2. Slightly adjust (B1) clockwise until picture falls out of sync with diagonal lines sloping to the left.

3. Turn the horizontal hold control clockwise. If more than three bars are present just before picture falls into sync, adjust the horizontal lock trimmer (B3) clockwise. If less than two bars are present, adjust B3 counter clockwise.

4. Set the horizontal hold control fully clockwise.

5. Slightly adjust (B1) counter clockwise until picture falls out of sync with diagonal lines sloping to the right. Then adjust (B1) clockwise until picture just falls into sync.

Adjust the horizontal drive trimmer (B4) clockwise as far as possible without vertical white line or compression on screen.

Adjust the horizontal size slug (B5) for a picture slightly wider than necessary to fill the picture mask horizontally.

Adjust the horizontal linearity slug (B6) until the picture is symmetrical from left to right. Readjustment of (B4) may be required to obtain optimum results.

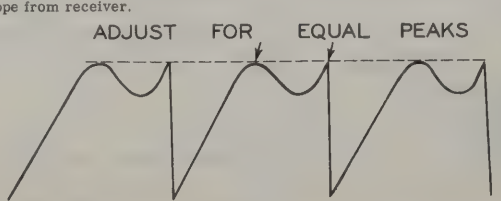


FIG. 8

PHOTOFACT* Folder

*TRADE MARK

RETMA MEMBER

BENDIX MODELS K2200, K2201, T2100E, M, T2101M (Ch. T19)

IMPORTANT FILING NOTICE

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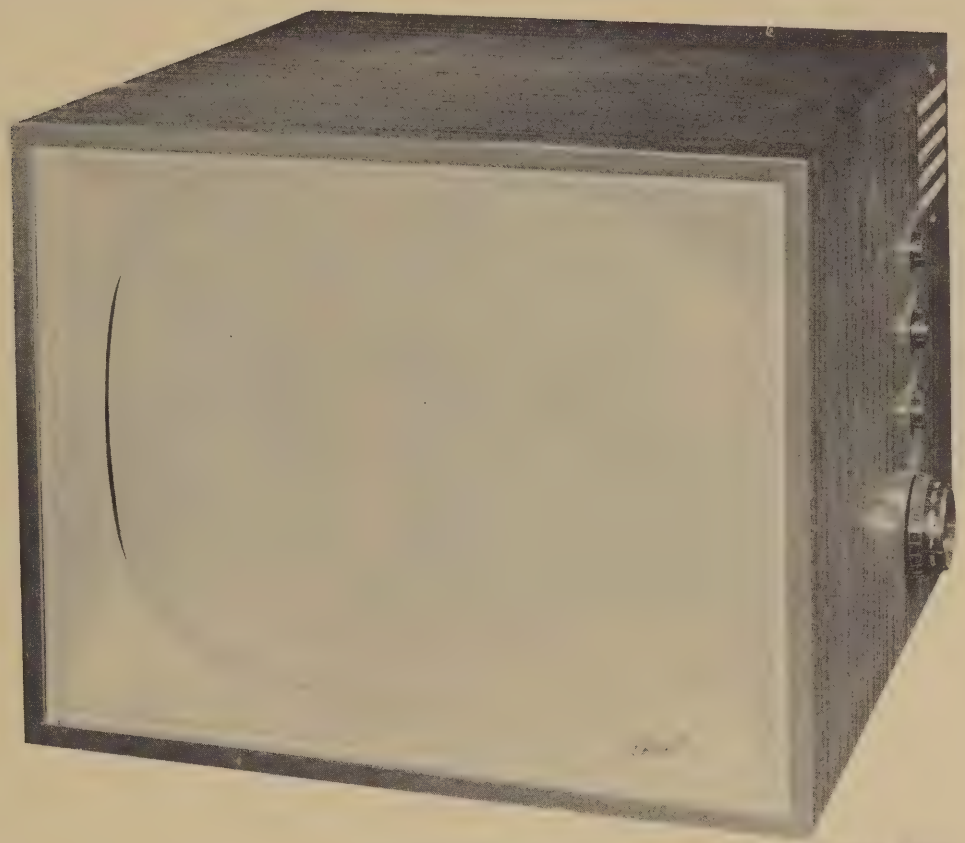
Merely insert the corresponding folder on this model in this envelope to retain proper filing and indexing order.



BENDIX MODEL T2100M

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

TRADE NAME	Bendix Models K2200, K2201, T2100E, T2100M, T2101M (Ch. T19)
MANUFACTURER	Bendix Radio, Division of Bendix Aviation Corp., Baltimore, Md.
TYPE SET	Television Receiver
TUBES	Fourteen
POWER SUPPLY	110-120 Volts AC-60 Cycle RATING 1.28 Amp. @ 117 Volts AC
TUNING RANGE-	Channels 2 thru 13, Video IF 26.4MC, Sound IF 21.9MC (Intercarrier)

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BENDIX MODELS K2200, K2201, T2100E, M, T2101M (Ch. T19)

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BENDIX MODELS K2200, K2201, T2100E, M, T2101M (Ch. T19)

PROPERTY OF
L. F. ELECTRONICS SHOP
3844 MEADE ST.
DENVER, COLORADO

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 5 push-on type control knobs from side panel of cabinet.

2. Remove 3 metal screws. Remove rear cover.

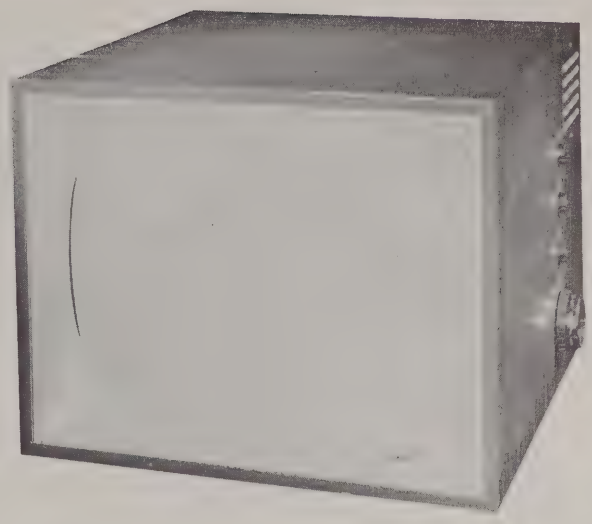
3. Disconnect picture tube socket, speaker leads and HV lead.

4. Remove ion trap, 2 metal screws holding AC interlock, antenna terminal bracket and wing nut screw from yoke.

5. Remove 2 chassis bolts from the bottom of the cabinet and 1 metal screw from chassis brace on the inside of the cabinet.

6. Remove 2 metal screws holding chassis to picture tube harness slide chassis and yoke carefully out of the cabinet.

7. Remove 2 speaker nuts. Remove speaker.



MODELS	CHASSIS
K2200, K2201, T2100E T2100M, T2101M	T19

BENDIX MODELS K2200, K2201, T2100E, M, T2101M (Ch. T19)

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF tuner oscillator circuit may be accomplished by removing the channel selector and fine tuning knobs.

PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass remove 2 safety glass retaining rails from each side of the safety glass by forcing the fingers behind the rails and bowing it out in the center until one end slips out. Remove both retaining rails and safety glass. Use extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

To remove picture tube, remove safety glass as above. Disconnect picture tube socket, HV lead and remove ion trap. Remove 4 metal screws holding harness to cabinet, remove picture tube with harness from cabinet. Remove tube from harness.

SERVICE ADJUSTMENT LOCATION

See cabinet rear view on page 16.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Adjustment of the horizontal oscillator (L23) is located on top of chassis. L23 may be adjusted without removing the back. Adjust L23 until picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the buzz control (R6) for maximum sound and minimum buzz.

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly centered.

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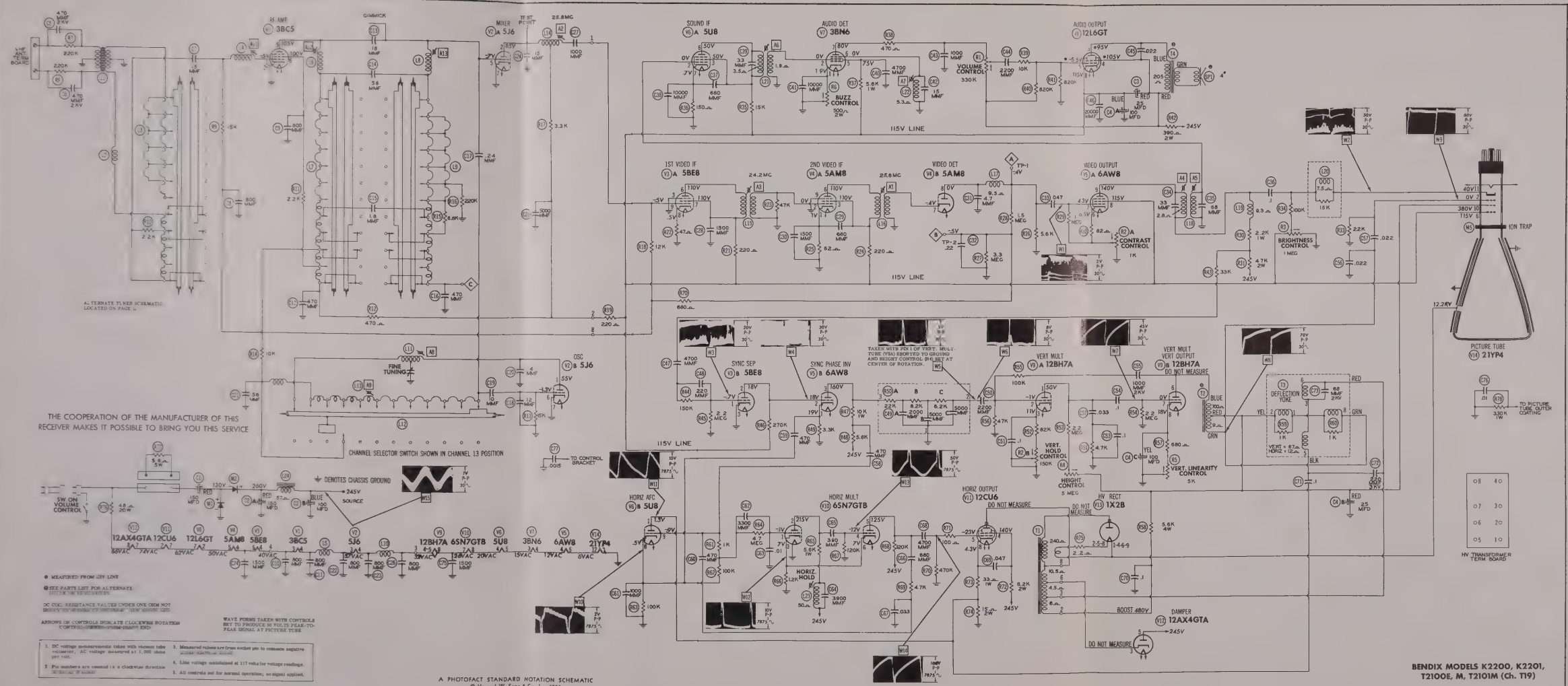
RF AMP 3BC5
GIMMICK
MIXER 5J6
1ST PT
25.8MC
SOUND IF 5U8
AUDIO DET 3BN6
AUDIO OUTPUT 12L6GT
VOLUME CONTROL 330K
BUZZ CONTROL
115V LINE
1ST VIDEO IF 5BE8
24.2MC
2ND VIDEO IF 5AM8
25.8MC
VIDEO DET 5AM8
VIDEO OUTPUT 6AW8
CONTRAST CONTROL 1K
BRIGHTNESS CONTROL 1 MEG
ION TRAP
PICTURE TUBE 21YP4
SYNC SEP 5BE8
SYNC PHASE INV 6AW8
VERT MULT 12BH7A
VERT MULT VERT OUTPUT 12BH7A
DO NOT MEASURE
VERT. HOLD CONTROL 150K
HEIGHT CONTROL 5 MEG
VERT. LINEARITY CONTROL 5K
DEFLECTION YOKE
HORIZ AFC 5U8
HORIZ MULT 6SN7GTB
HORIZ HOLD
HORIZ OUTPUT 12CU6
HV RECT 1X2B
DAMPER 12AX4GTA
BOOST 480V
HV TRANSFORMER TERM BOARD
TO PICTURE TUBE OUTER COATING
TO CONTROL BRACKET
FINE TUNING
OSC 5J6
CHANNEL SELECTOR SWITCH SHOWN IN CHANNEL 13 POSITION
ALTERNATE TUNER SCHEMATIC LOCATED ON PAGE L
THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
SW ON VOLUME CONTROL
DENOTES CHASSIS GROUND
245V SOURCE
12AX4GTA 12CU6 12L6GT 5AM8 5BE8 3BC5 5J6 12BH7A 6SN7GTB 5U8 3BN6 6AW8 2IYP4
WAVE FORMS TAKEN WITH CONTROLS SET TO PRODUCE 30 VOLTS PEAK-TO-PEAK SIGNAL AT PICTURE TUBE
TAKEN WITH PIN 1 OF VERT. MULT. TUBE (V9A) SHORTED TO GROUND AND HEIGHT CONTROL (R54) SET AT CENTER OF ROTATION.
1. DC voltage measurements taken with vacuum tube voltmeter, AC voltage measured at 1,000 ohms per volt.
2. Pin numbers are counted in a clockwise direction
3. Measured values are from socket pin to common negative
4. Line voltage maintained at 117 volts for voltage readings.
5. All controls set for normal operation; no signal applied.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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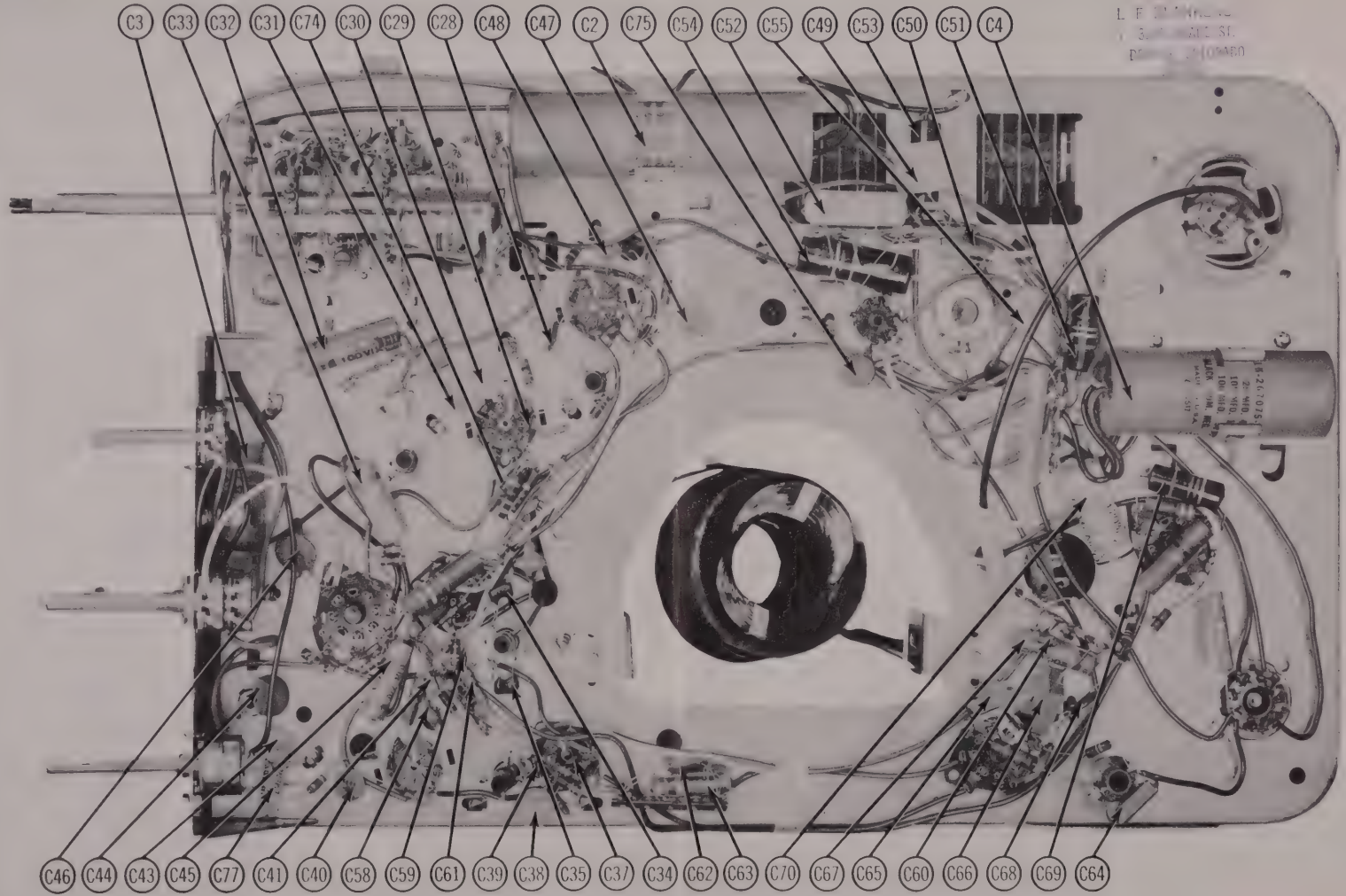
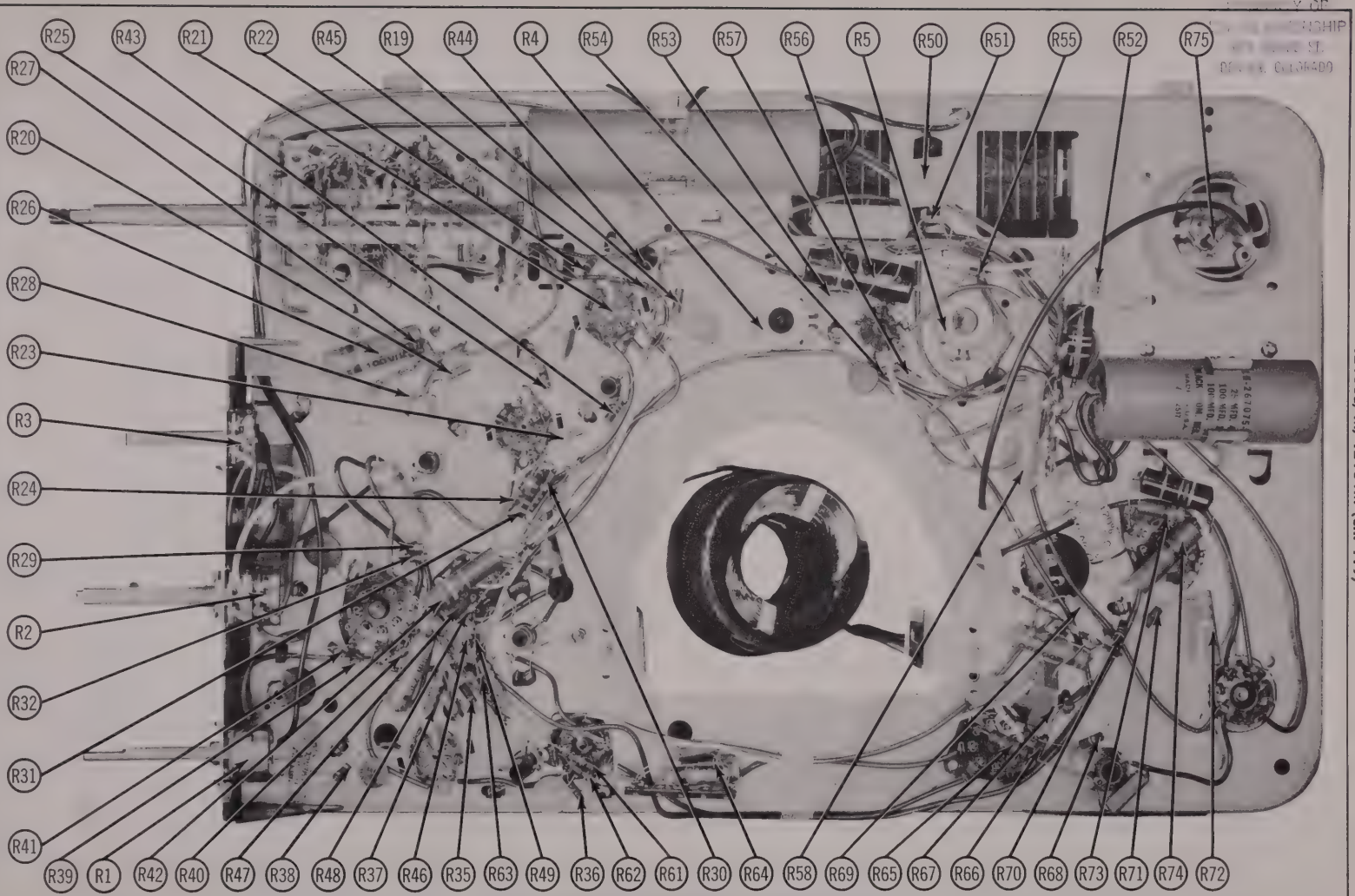
BENDIX MODELS K2200, K2201, T2100E, M, T2101M (Ch. T19)

BENDIX MODELS K2200, K2201, T2100E, M, T2101M (Ch. T19)



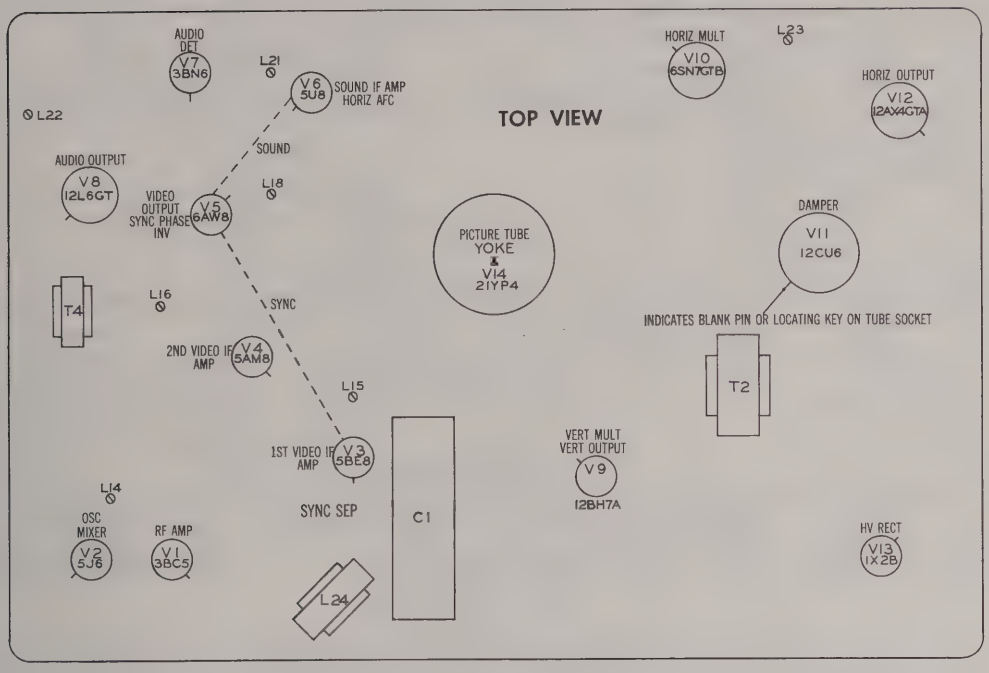
CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

PROPERTY OF
L. F. BLANKENSHIP
3926 MEADE ST.
DENVER, COLORADO

TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

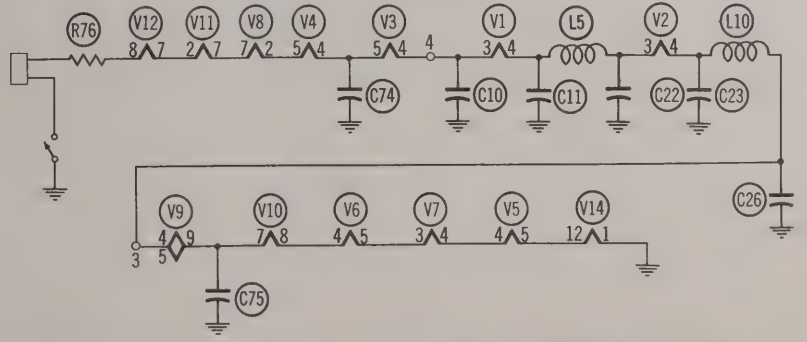
POWER SUPPLY FAILURE
No raster, no sound - **Selenium Rectifiers (M1 & M2)**

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - **V2, V3, V4, V5, V8**
No pic, no sound, has snow - **V1, V2, V3**
No pic, has sound, has raster - **V5, V14**
Has pic, no sound - **V6, V7, V8**

SYNC FAILURE
No vert. sync - **V5, V9**
No horiz. sync - **V5, V10**
No vert. or horiz. sync - **V3, V5**

SWEEP FAILURE
No raster, has sound - **V10, V11, V12, V13, V14**
No vertical deflection - **V9**
Poor vert. linearity or foldover - **V9**
Poor horiz. linearity or foldover -**V10, V11, V12**
Narrow picture - **V10, V11, V12, V13, M1, M2**
Vert. off freq. - **V5, V9**
Horiz. off freq. - **V5, V10**

NOTE: Since this receiver employs tubes used in series-parallel filament network, an open filament in any tube in series may cause the set to be inoperative. (See circuit below).



SET 306 FOLDER 4

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use an isolation transformer to protect the test equipment.
Allow sufficient time for receiver and test equipment to warm up.
The high voltage lead should be securely taped and kept away from chassis.

VIDEO IF ALIGNMENT

Connect the negative lead of a 3 volt battery to point (B). Connect the positive lead to chassis.
Use only enough signal generator output for useable indication on VTVM, approximately -2 volts.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	Direct	High side to an ungrounded tube shield floating over converter tube (V2). Low side to chassis.	25.8MC (Unmod.)	Any non-interfering channel	DC probe to point (A). Common to chassis.	A1, A2	Adjust for maximum deflection.
2.	"	"	24.2MC	"	"	A3	"

OVERALL VIDEO IF RESPONSE CHECK

Connect bias as under "Video IF Alignment".
Attenuate sweep generator output for -2 volts at point (A).
If sweep generator has no built-in marker, loosely couple marker generator to sweep generator output.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
3.	Direct	High side to an ungrounded tube shield floating over converter tube. Low side to chassis.	24MC (10MC Swp.)	21.9 26.4	Any non-interfering channel	Vert. Amp. thru 10KΩ to point (A). Low side to chassis.		Check for response similar to Fig. 1. If necessary slightly retouch A1, A2 and A3 for proper response. A1 affects the high frequency side of curve. A3 affects low frequency side of curve. A2 affects center frequency.

4.5MC TRAP ALIGNMENT

Set contrast control for maximum.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
4.	.01MFD	High side to point (A). Low side to chassis.	Not used	4.5MC (400∿mod.)	Any non-interfering channel	Vert. Amp. thru detector (Fig. 2) to pin 11 (cathode) of picture tube. Low side to chassis.	A4	Adjust for MINIMUM 400∿ indications on scope.

SOUND IF ALIGNMENT USING ON THE AIR SIGNAL

Remove the bias battery. Replace original shield over converter tube. Turn set on and tune in a strong TV signal. Turn the buzz control (R6) 90 degrees from maximum clockwise rotation. Adjust A7 for maximum volume. Reduce the signal strength into the receiver by inserting an attenuator in series with the antenna and receiver antenna terminals. If a suitable attenuator is not available, remove the antenna from the antenna terminals and stray feed the signal into the receiver by placing the antenna near the antenna terminals. Adjust A5 and A6 for maximum volume. Adjust R6 for minimum noise. Reconnect antenna and readjust A7 for maximum volume. If necessary, reduce volume so that this peak can be heard.

OSCILLATOR ALIGNMENT FOR TUNER 258065-1

Set the fine tuning control to the center of its range. Set the channel selector to the highest high band (7-13) station operating in the area. Adjust the high band oscillator adjustment (A8) for best picture detail.
Set the channel selector switch to the highest low band channel (2-6) operating in the area. Adjust the low band oscillator adjustment (A9) for best picture detail. Recheck setting of A8 and if it has changed repeat entire procedure.

OSCILLATOR ALIGNMENT FOR TUNER 258066-1

Set the fine tuning control to the center of its range. Set the channel selector to the highest high band (7-13) operating in the area. Adjust the high band oscillator adjustment (A10) for best picture detail. Recheck all other high band channels. If necessary make compromise adjustment of A10.

ALIGNMENT INSTRUCTIONS (cont)

RF AND MIXER ALIGNMENT FOR TUNER 258065-1

Connect the negative lead of a 3 volt battery to terminal #8 (AGC) on back of tuner. Connect the positive lead to chassis.
If the sweep generator has no built-in marker, couple a separate marker generator loosely to sweep generator output. Use only enough sweep and marker generator output for useable pattern on scope.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
5.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	207MC (10MC Swp.)	205.25MC 209.75MC	12	Vert. Amp. thru 10KΩ to point Ⓒ. Low side to chassis.	A11, A12, A13	Adjust for response curve similar to Fig. 3.
6.	"	"	213MC (10MC Swp.)	211.25MC 215.75MC	13	"		Check for response similar to Fig. 3. If markers fall below 70% on any channel, make compromise adjustments of A11, A12, A13 with channel switch set to that channel. Check all other channels to see that they have not been seriously affected.
			201MC (10MC Swp.)	199.25MC 203.75MC	11			
			195MC (10MC Swp.)	193.25MC 197.75MC	10			
			189MC (10MC Swp.)	187.25MC 191.75MC	9			
			183MC (10MC Swp.)	181.25MC 185.75MC	8			
			177MC (10MC Swp.)	175.25MC 179.75MC	7			
			85MC (10MC Swp.)	83.25MC 87.75MC	6			
			79MC (10MC Swp.)	77.25MC 81.75MC	5			
			69MC (10MC Swp.)	67.25MC 71.75MC	4			
			63MC (10MC Swp.)	61.25MC 65.75MC	3			
			57MC (10MC Swp.)	55.25MC 59.75MC	2			

RF AND MIXER ALIGNMENT FOR TUNER 258066-1

This portion of the tuner alignment has been properly aligned at the factory and is very stable. Alignment of this portion is not recommended in the field.

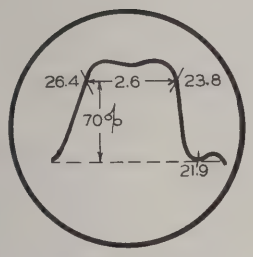


FIG.1

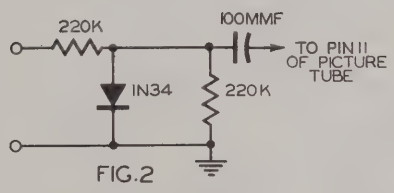


FIG.2

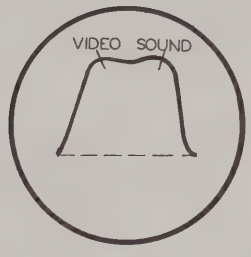


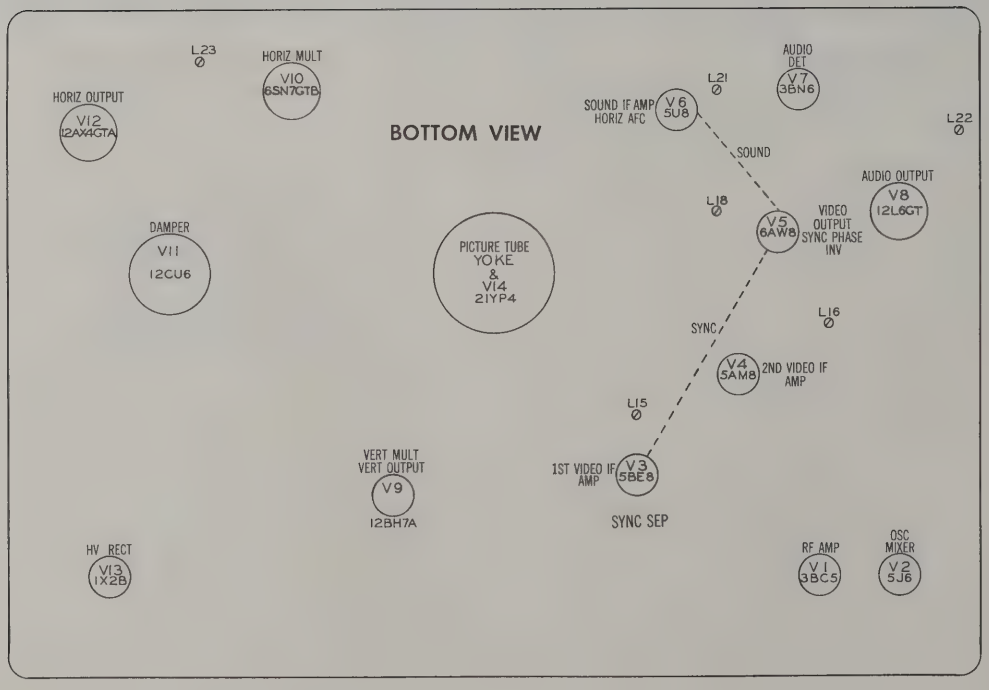
FIG.3

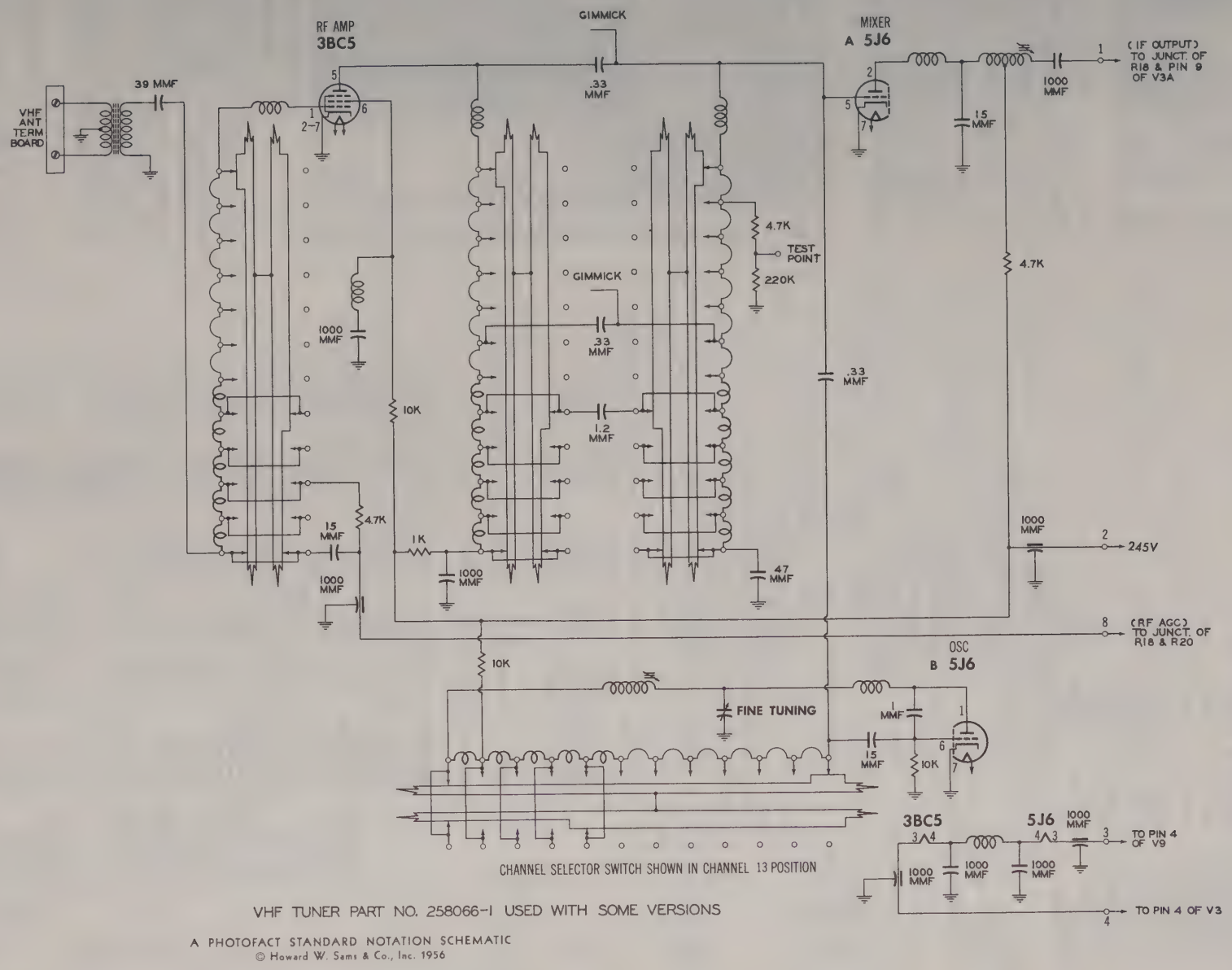
PROPERTY OF
C. F. BLANKENSHIP
824 MADE ST
DENVER, COLORADO

RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	3BC5	1Meg	0Ω	15Ω	14Ω	■700Ω	■3KΩ	0Ω		
V 2	5J6	■11KΩ	■3. 5KΩ	14Ω	13Ω	220KΩ	15KΩ	0Ω		
V 3	5BE8	2. 2Meg	■270KΩ	0Ω	15Ω	17Ω	■220Ω	■220Ω	47Ω	1Meg
V 4	5AM8	82Ω	. 4Ω	■220Ω	17Ω	19Ω	■220Ω	. 4Ω	5. 6KΩ	0Ω
V 5	6AW8	3. 3KΩ	■270KΩ	†16KΩ	1Ω	4Ω	350Ω	1Meg	200KΩ	†7KΩ
V 6	5U8	15Ω	. 8Ω	■15KΩ	8Ω	6Ω	■15KΩ	150Ω	100KΩ	300KΩ
V 7	3BN6	250Ω	1. 9Ω	6Ω	4Ω	■5. 6KΩ	5. 3Ω	†330KΩ		
V 8	12L6GT	TP	19Ω	†600Ω	†390Ω	400KΩ	TP	21Ω	200KΩ	
V 9	12BH7A	▲4. 5Meg	47KΩ	130KΩ	13Ω	13Ω	▲6. 5KΩ	2. 2Meg	1. 3KΩ	10Ω
V 10	6SN7GTB	5Meg	†5. 6KΩ	1. 2KΩ	120KΩ	†120KΩ	1. 2KΩ	10Ω	8Ω	
V 11	12CU6	NC	23Ω	TP	†8. 2KΩ	470KΩ	NC	21Ω	48Ω	TOP CAP ▲10. 5Ω
V 12	12AX4GTA	NC	NC	500KΩ	NC	†57Ω	NC	23Ω	25Ω	
V 13	1X2B		PINS	1-8	HAVE	INF	RESISTANCE			TOP CAP ▲250Ω
V 14	21YP4	0Ω	22KΩ	PIN 6 200KΩ	PIN 10 ▲5. 6KΩ	PIN 11 ■600KΩ	PIN 12 1Ω			

■MEASURED FROM 115V LINE.
†MEASURED FROM OUTPUT OF M2.
▲MEASURED FROM PIN 3 OF V12.
NC-NO CONNECTION.
TP-TIE POINT.





CHANNEL SELECTOR SWITCH SHOWN IN CHANNEL 13 POSITION

VHF TUNER PART NO. 258066-1 USED WITH SOME VERSIONS

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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ALTERNATE TUNER SCHEMATIC

BENDIX MODELS K2200, K2201, T2100E, M, T2101M (Ch. T19)

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: BENDIX PART No.	STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	RF Amplifier	6BC6	6BC6	7BD	
V2	Mixer-Osc.	6J6	6J6	7BF	
V3	Int. Video IF Amp.-Sync Separator	5BK8	5BK8	9EQ	
V4	Snd. Video IF Amp.-Video Detector	6AM8	6AM8	9CY	
V5	Video Output-Sync Phase Inv.	6AW8	6AW8	9DX	
V6	Sound IF Amp.-Horiz. AFC	5U8	5U8	9AX	
V7	Audio Detector	3BN6	3BN6	7DF	
V8	Audio Output	12L8GT	12L8GT	7AC	
V9	Vert. Multi-Vert. Output	12BH7A	12BH7A	9A	
V10	Horiz. Mult.	6BN7GTB	6BN7GTB	9BD	
V11	Horiz. Output	12CU6	12CU6	9AM	
V12	Damper	12AX4GTA	12AX4GTA	9CG	
V12	HV Rectifier	DX3	DX3	9Y	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA: BENDIX PART No.	CBS	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.	RETMA BASE TYPE	NOTES
V14	21YP4	21YP4	21YP4	21YP4	21YP4	13L	① Aluminized
	21YP4A ①	21YP4A ①	21YP4A ①	21YP4A ④	21YP4A ①	13L	② Silver screen

ELECTROLYTIC CAPACITORS

ITEM No.	RATING: CAP	VOLT	REPLACEMENT DATA: BENDIX PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1	150	300	3670?8-1	PRI-100		WR437	TD-150-300	S-300	
C3A	150	300	3670?7-1	E35B145		WD-425	CDB-1014		
B	100	300							
C3	25	330	3670?8-1	PRS350V24	1BR3C25	TC25	TD-30-350	PM-3530	TVA-1510
C4A	100	150	3670?5-1	E35B144			TM-D100-150	D-100	
B	15	450				TC75	TD-20-450	PM-4520	
C	100	50							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP	VOLT	REPLACEMENT DATA: BENDIX PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C5	470	2000	2670?46-471	HVD-30-00647	DD30-471	V3T47	3KV-471	DC30347	30GA-T47	
C6	470	2000	2670?46-471	HVD-20-00647	DD20-471	V2T47	2KV-471	DC20347	20GA-T47	
C7	15			SII5	D6-150	TP1I	GP1K-150	UC-5415	5GA-Q15	
C8	900			BPD-0008	DD-801	KD69	831-801	DC-521	5GA-T8	
C9	900			BPD-0008	DD-801	KD69	831-801	DC-521	5GA-T8	
C10	600			BPD-0008	DD-801	KD69	831-801	DC-521	5GA-T8	
C11	600			BPD-0008	DD-801	KD69	831-801	DC-521	5GA-T8	
C12	470			SI470	D6-471	TP46	GP3K-471	UC-5347	5GA-T47	
C13	.18									
C14	.56									
C15	1.8									
C16	470			SI470	D6-471	TP46	GP3K-471	UC-5347	5GA-T47	
C17	.24									
C18	1.0				TC2-12	TE10	NP0K-150			
C19	10			N750-RZ10	TCN-10	TW01	N750A-100	NT-541	5TCU-Q1	
C20	4									
C21	.56									
C22	800			BPD-0008	DD-801	KD69	831-801	DC-521	5GA-T8	
C23	800			BPD-0008	DD-801	KD69	831-801	DC-521	5GA-T8	
C24	15			SII5	D6-150	TP1I	GP1K-150	UC-5415	5GA-Q15	
C25	5000			BPD-005	DD-502	KD80	812-005	DC-525	5HK-D5	
C26	800			BPD-0008	DD-801	KD69	831-801	DC-521	5GA-T8	
C27	1000			BPD-001	DD-102	KD69	801-001	DC-531	5HK-D1	
C28	1500		CC262Y5Y152M	BPD-0015	DD-152	KD71	801-0015	DC-5315	5HK-D15	
C29	680		CC261Y5Y681M	BPD-0068	DD-681	KD65	811-681		5GA-T68	
C30	1500		CC262Y5Y152M	BPD-0015	DD-153	KD71	801-0015	DC-5315	5HK-D15	
C31	4.7		2670?44-?47	HVD-0015	TC2-4R7	2U10	NP0A-4R7	DT-515	5TCU-T47	
C32	.22	100	267071-224	PZ5BN-22		CUB2P22		PT4022	2TM-P22	
C33	.047	300	2670?8-473	BPD-58	DF-503	CUB5Z47		PT4547	5TM-D47	
C34	33		267?18-330	NPO-8J33	D6-330	TZ1S	831-330		5TCC-Q33	
C35	68		267?18-680	NPO-8J68	D6-680	TZ2S	831-680		5TCC-Q68	
C36	1	400	2670?6-104	P488N-1	DF-104	CUB4P1		PT401	4TM-P1	
C37	680		CC261Y5Y681M	BPD-0068	DD-681	KD65	811-681	UC-5365	5GA-T68	
C38	10000		CC263Z5Z103P	BPD-01	DD-103	KD87	811-01	DC-511	5HK-C1	
C39	33		267?18-330	NPO-8J33	D6-330	TZ1S	831-330		5TCC-Q33	
C40	4700		CC262Z5Z472P	BPD-0047	DD-472	KD79	811-0047	DC-525	5HK-D47	
C41	10000		CC263Z5Z103P	BPD-01	DD-103	KD83	811-01	DC-511	5HK-E1	
C42	15		267?18-150	NPO-8J15	D6-150	TZ1I	831-150		5TCC-Q15	
C43	1000		CC261Y5Y102M	BPD-001	DD-102	KD69	801-001	DC-531	5HK-C1	
C44	2200		CC262Y5Y222M	BPD-0022	DD-222	KD73	811-0022	UC-5322	5HK-D22	
C45	.022	400	267069-222	BPD-02	DF-203	CUB4Z22	817-02	PT4122	4TM-S22	
C46	10000		CC263Z5Z103P	BPD-01	DD-103	KD85	817-02	PT4Z2	5HK-E2	
C47	4700		CC262Z5Z472P	BPD-0047	DD-472	KD79	811-0047	DC-525	5HK-D47	
C48	220		CC223Y5Y331M	SII30	D6-331	TP39	GP3K-331	UC-5332	5GA-T23	
C49A	2000							DC-523		
B	5000		±274310-1	49A-I20	49C-I00	41I5TM1	41405-01	DC-525	49-1	
C	5000							DC-525		
C50	3300		CC263Y5Y332M	1664-0022		BD5D33			MS-322	
C51	.1	200	267058-104	P288N-1	DF-104	CUB2P1		PT401	2TM-P1	
C52	.033	600	267058-333	P298N-1	DF-303	CUB6Z33		PT603	6TM-S33	
C53	.1	400	267058-104	P488N-1	DF-104	CUB4P1		PT401	4TM-P1	
C54	.1	600	267058-104	P698N-1	DF-104	CUB6P1		PT601	6TM-P1	
C55	1000	2000	267045-102	HVD-30-001	DD30-102	V2D1	3KV-102	DC3021	30GA-D1	
C56	.022	600	267055-223	BPD-02	DF-203	CUB6Z22	817-02	PT6122	6TM-S22	
C57	.022	600	267055-223	BPD-02	DF-203	CUB6Z22	817-02	PT6122	6TM-S22	
C58	470		CC223Y5Y471M	SI470	D6-471	TP46	GP2K-471	UC-5347	5GA-T47	
C59	470		CC223Y5Y471M	SI470	D6-471	TP46	GP2K-471	UC-5347	5GA-T47	
C60	470		CC223Y5Y471M	SI470	D6-471	TP46	GP2K-471	UC-5347	5GA-T47	
C61	1000		CC261Y5Y102M	SD200	D6-102	TP58	GP2L-102	UC-531	5HK-D1	
C62	3300		CC263Y5Y332M	BPD-0033	D6-332	KD77	GP3-333-332	UC-5333	5HK-D33	
C63	.01	300	267068-103	BPD-01	D6-103	CUB4S1	GP3-333-103	PT401	4TM-S1	
C64	3900	500	CM42Z392K	1464-0029		BR5D39		MC5G45	MS-339	
C65	3900	500	CM42Z392K	1464-00039	D6-391	SR5T39	811-391	MC3G45	MS-339	
C66	680	500	CM42W681K	1464-00068	D6-681	DR5T68	811-681		MS-368	

PARTS LIST AND DESCRIPTIONS

CAPACITORS (cont)

ITEM No.	RATING: CAP	VOLT	REPLACEMENT DATA: BENDIX PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C67	.033	300	267068-333	BPD-03	DF-303	CUB6S33		PT6133	6TM-S33	
C68	4700		CC263Z5Z472P	BPD-0047	DD-472	KD79	811-0047	DC-525	5HK-D47	
C69	.047	400	267036-473	BPD-05	DF-503	CUB4S47		PT4147	4TM-S47	
C70	.1	600	267055-104	P698N-1	DF-104	CUB6P1		PT601	6TM-P1	
C71	.1	600	267055-104	P698N-1	DF-104	CUB6P1		PT601	6TM-P1	
C72	220	3000	267067-221	HVD-30-220	DD30-221	V3T22	3KV-221	DC30322	30GA-T22	
C73	68	3000	2?5165-5	HVD-30-68	DD30-680	V3K68	3KV-680	DC30468	30GA-Q68	
C74	1500		CC262Y5Y152M	BPD-0015	DD-152	KD71	801-0015	DC-5315	5HK-D15	
C75	1500		CC262Y5Y152M	BPD-0015	DD-152	KD71	801-0015	DC-5315	5HK-D15	
C76	.01	600	267055-103	BPD-01	DD-103	KD85	CUB6S1	PT603	6TM-S1	
C77	.0015	600	267055-152	BPD-0015	D6-152	CUB6D15	GP2L-152	PT6215	6TM-D15	

* Items C49A, C49B, C49C, R50A, R50B and R50C are combined in one unit.

CONTROLS

ITEM No.	RATING: RESIST. ANCE	WATTS	REPLACEMENT DATA: BENDIX PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	350Ω	½	282053-1	AB-58	A47-350K-B	Q11-152		Volume
B	Shaft		Not Req.	AK-3	FS-3	Not Req.		Attach to R1A.
C	Switch		Not Req.	KD-1	SWR-12	T6-1		Attach to R1A.
R2A	1000Ω	½	262045-7	F1-5		Q1-837+	UE40	Contrast (Panel)
B	150KΩ	½		R2-32				Vertical Hold (Rear)
R3A	1Meg	½	263051-1	B-59	A47-1Meg-S	Q11-127	TA15L	Brightness
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R3A.
R4A	5Meg	½	262052-29	AB-57	A47-5Meg-S	Q11-141	SU-57	Height
B	Shaft		Not Req.	AK-19	RN-1	TQ	Not Req.	Attach to R4A.
R5A	5000Ω	½	282035-30	BX-10	A49-5000-S	Q11-114	SU-14	Vertical Linearity
B	Shaft		Not Req.	Not Req.	RN-1	TQ	Not Req.	Attach to R5A.
R6	500Ω	2	262053-1		39-500			Buzz (Wire Wound)

+Concentric†It Equivalent; K-1 Kit, Base Elements And Shafts; B11-108, P2-309 (Panel)
B11-125, B30-315 (Rear)

RESISTORS

ITEM No.	RATING: OHMS	WATTS	REPLACEMENT DATA: BENDIX PART No.	IRC PART No.	NOTES
R7	220KΩ	½	RC23A224M	BTS-220K	
R8	220KΩ	½	RC23A224M	BTS-220K	
R9	15KΩ	½		BTS-15K	
R10	2200Ω	½		BTS-2200	
R11	2200Ω	½		BTS-2200	
R12	470Ω	½		BTS-470	
R13	15KΩ	½		BTS-15K	
R14	10KΩ	½		BTS-10K	
R15	6800Ω	½		BTS-6800	
R16	220KΩ	½		BTS-220K	
R17	330Ω	½			
R18	12KΩ 5%	½	RC23A123J	BTS-12K 5%	
R19	22KΩ	½	RC23A223M	BTS-220	
R20	68Ω	½	RC23A680M	BTS-680	
R21	220Ω	½	RC23A221M	BTS-220	
R22	470Ω	½	RC23A470K	BTS-47	
R23	47KΩ 5%	½	RC23A473J	BTS-47K 5%	
R24	220Ω	½	RC23A221M	BTS-220	
R25	82Ω	½	RC23A820K	BTS-82	
R26	5600Ω 5%	½	RC23A562J	BTS-5600 5%	
R27	3.3Meg	½	RC23A335K	BTS-3.3Meg	
R28	1.5Meg	½	RC23A155K	BTS-1.5Meg	
R29	1Meg	½	RC23A105M	BTS-1Meg	
R30	2200Ω	½	RC24A222X	BTA-2200	
R31	4700Ω	2	RC26A472K	BTH-4700	
R32	82Ω	½	RC23A820K	BTS-82	
R33	22KΩ	½	RC23A223K	BTS-22K	
R34	100KΩ	½	RC23A104M	BTS-100K	
R35	15KΩ	½	RC23A153M	BTS-15K	
R36	150Ω	½	RC23A151M	BTS-150	
R37	5600Ω	½	RC23A562K	BTS-5600	
R38	470Ω	½	RC23A471K	BTS-470	
R39	820Ω	½	RC23A831M	BTS-820	
R40	820KΩ 5%	½	RC23A824J	BTS-820K 5%	
R41	820KΩ 5%	½	RC23A824J	BTS-820K 5%	
R42	33Ω	½	RC23A330K	BTS-330	
R43	33KΩ	½	RC23A333M	BTS-33K	

ITEM No.	RATING: OHMS	WATTS	REPLACEMENT DATA: BENDIX PART No.	IRC PART No.	NOTES
R44	150KΩ	½	RC23A154M	BTS-150K	
R45	2.2Meg	½	RC23A225M	BTS-2.2Meg	
R46	270KΩ	½	RC23A274K	BTS-270K	
R47	10KΩ	½	RC24A103K	BTA-10K	
R48	5600Ω	½	RC23A562K	BTS-5600	
R49	3300Ω	½	RC23A332K	BTS-3300	
R50A	22KΩ	½		BTS-22K	
B	8200Ω	½	±274310-1	BTS-8200	
C	3300Ω	½		BTS-3300	
R51	470Ω	½	RC23A472K	BTS-470	
R52	82KΩ	½	RC23A823K	BTS-82K	
R53	2.2Meg	½	RC23A225M	BTS-2.2Meg	
R54	2.2Meg	½	RC23A225M	BTS-2.2Meg	
R55	100KΩ	½	RC23A104K	BTS-100K	
R56	47KΩ	½	RC23A473K	BTS-47K	
R57	680Ω	½	RC23A681K	BTS-680	
R58	5600Ω	4	2?6019-1		
R59	100Ω	½	RC23A101K		
R60	1000Ω	½	RC23A102K		
R61	100KΩ	½	RC23A104K		
R62	100KΩ	½	RC23A104K		
R63	100KΩ	½	RC23A104K		
R64	4.7Meg	½	RC23A475M		
R65	5600Ω	1	RC24A562K		
R66	12000Ω 5%	2	RC26A123J	BTH-1200 5%	
R67	1200Ω	½	RC23A124K		
R68	120KΩ	½	RC23A124K		
R69	4700Ω	½	RC23A472K		
R70	470KΩ	½	RC23A474M		
R71	100Ω	1	RC24A101M		
R72	8200Ω	1	RC24A823K	BTB-8200	
R73	33Ω	1	RC24A330M		
R74	1KΩ	1	RC24A102K		
R75	2.2Ω	1	268000-022	SWJ-2.2	
R76	68Ω	20	268039-1	2D-50	
R77	5.6Ω	5	268021-1		
R78	330KΩ	½	RC24A334M	BTA-330K	

* Items C49A, C49B, C49C, R50A, R50B, R50C are combined in one unit.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA: BENDIX PART No.	Halldorson PART No.	Merit PART No.	RCA TYPE No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	Horiz. Output Trans.	265106-1				X125*		FLY-80*	
T2	Vert. Output Trans.	265107-1	Z1804	A-3037	32T21	V313	A-8125	28S52	A-102X
		265107-2 ①							
T3A	Yoke Horiz. (8.5MH)	265105-2 ②	DF6GI ③④	MDF-70 ③	2D6DN ③④	T70F08 ③	DY-8A ③	T-5 ③	Y-12-1 ③
B	Yert. (42MH)						⑤		⑤

① Alternate Bendix part number
② Includes capacitor C73; resistors R59, R60; Rear cover & centering device.
③ Use original rear cover & centering device.
④ Connect horiz. damping network across terms #3 & #7. Term #3 then connects to term #3 on horiz. output trans.
⑤ Removes capacitor from terms #1 & #3. Term #3 then connects to term #3 on horiz. output trans.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
8				6		6	
6				8		8	
3				3		3	
2				2		2	

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI.	SEC.	REPLACEMENT DATA: BENDIX PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T4	3.5KΩ	3.3Ω	266092-6	Z1005 ①	A-3928 ①	A-3878 ①	26S50 ①	S-1X ①	① Drill one new mounting hole.
			266092-7 ②						② Alternate Audio Output Trans.

SPEAKER

ITEM No.	RATINGS: SIZE	FIELD	V. C. IMP	REPLACEMENT DATA: BENDIX PART No.	QUAM PART No.	NOTES
SP1	4"	PM	3.3Ω	256017-5 ①	4A07	① Used in Models K2300, and K2301.
	6"	PM	3.3Ω	256004-3 ②	6A1	② Used in Models T2100Z, T2100M, T2101M

COILS (RF-IF)

ITEM No.	USE	DC RES.: PRI.	SEC.	REPLACEMENT DATA: BENDIX PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No	NOTES
L1	Ant. Trans.	.10CT	0Ω	275167-1				
L2	Ant. Coil	0Ω						Channel 6
L3	Ant. Coils	0Ω						
L4	Ant. Coil	0Ω						Channel 13
L5	Fil. Choke	0Ω						
L6	RF Coil	0Ω						Channel 13
L7	RF Coils	0Ω						
L8	Mixer Grid Coil	0Ω						Channel 13
L9	Mixer Grid Coils	0Ω						
L10	Fil. Choke	0Ω						
L11	Osc. Coil	0Ω						Tapped-Channel 13
L12	Osc. Coils	0Ω						
L13	Osc. Coil	0Ω						Channel 6
L14	1st Video IF	.5Ω						Tapped ① .3Ω
L15	2nd Video IF	.4Ω	.4Ω	259161-1	17-1062	TV-116*	6249	
L16	3rd Video IF	.4Ω	.4Ω	259145-5	17-1064	TV-116*	6250	
L17	Series Peaking Coil	9.5Ω		259130-9	19-3180	TV-184	6180	180 Microhenries
L18A	4.5MC Trap	2.5Ω		259162-1				
B	1st Sound IF	.8Ω						
L19	Shunt Peaking Coil	9.3Ω		259130-11	19-4400	TV-190	6134	390 Microhenries
L20	Series Peaking Coil	7.5Ω		259130-10	19-3250*	TV-185*	6130*	270 Microhenries, Wound on 15KΩ resistor
L21	2nd Sound IF	3.5Ω	1.9Ω	259163-1				
L22	Quadrature Coil	5.3Ω		259164-1	20-1005	TV-151	1469	

* Enlarge mounting hole.
∎ Parallel with 15KΩ resistor.

TRANSFORMER (HORIZ. OSC.)

ITEM No.	DC RES.: PRI.	SEC.	REPLACEMENT DATA: BENDIX PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	RCA TYPE No.	Ram PART No.	Thordarson PART No.	NOTES
L23	50Ω		251405-1	19-1576	TV-163	6210			8S-5	

FILTER CHOKE

ITEM No	RATINGS: TOTAL DIRECT CURRENT	D.C. RESISTANCE	INDUCTANCE @ CURRENT	REPLACEMENT DATA: BENDIX PART No	Halldorson PART No	Merit PART No.	Stancor PART No	Thordarson PART No	Triad PART No
L24	.210ADC	87Ω	1.15HY	265093-6	C5040	C-2094	C-2327	28C41	C-21X ②
				265093-5 ①					

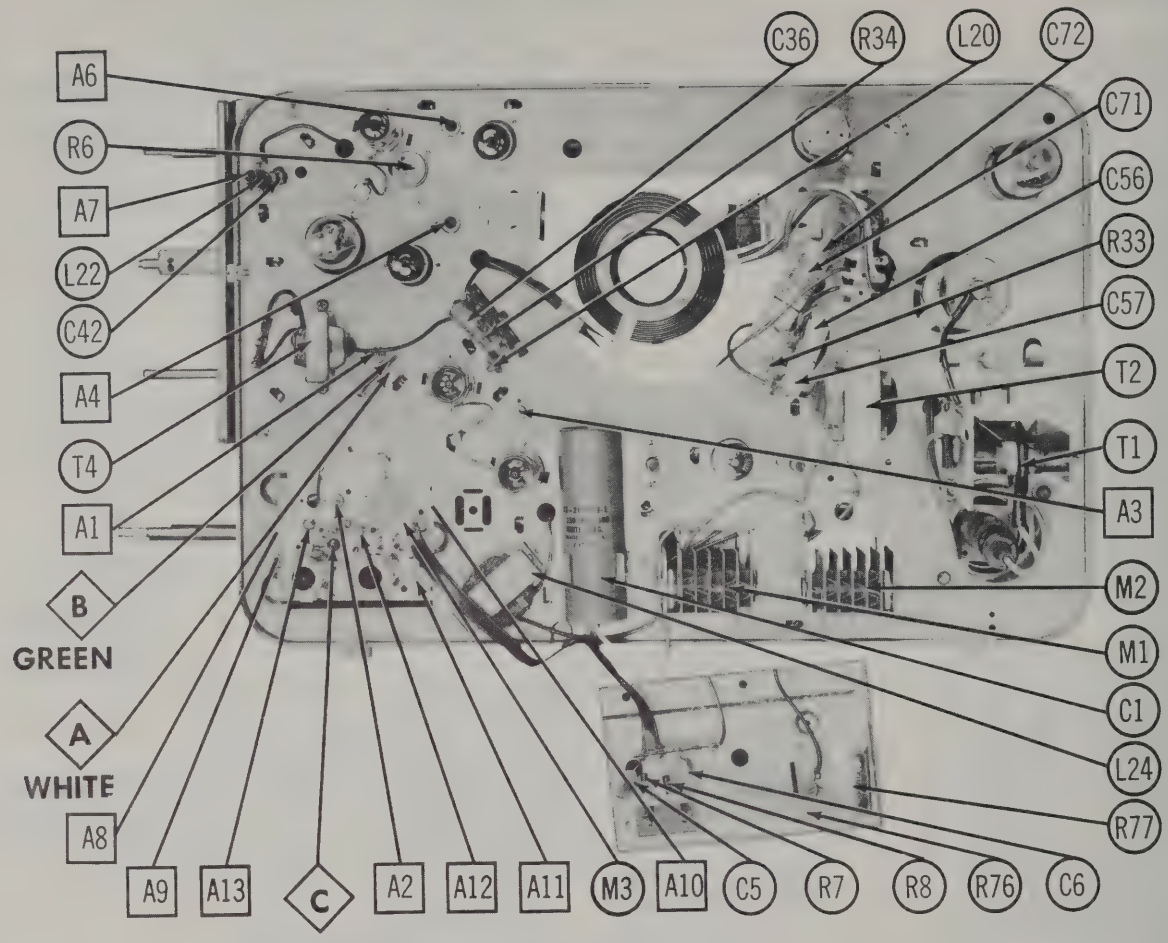
① Alternate Filter Choke.
② Drill one new mounting hole.

SELENIUM RECTIFIER

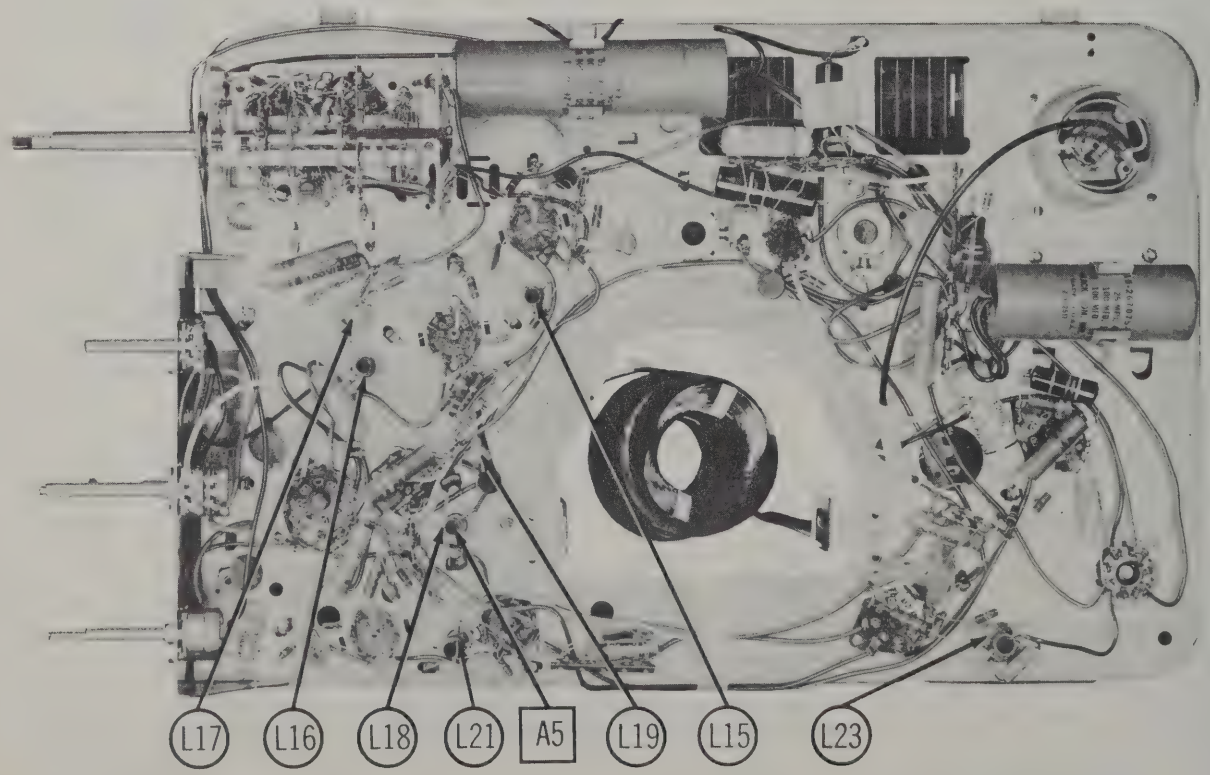
ITEM No.	RATING: CURRENT	REPLACEMENT DATA: BENDIX PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	RADIO RECEPTOR PART No.	SARKES TARZIAN PART No.	NOTES
M1	.2@ADC	268619-1	1090A	R3250	6S250	6Q4	250	
M2	.2@ADC	268619-1	1090A	R3250	6S250	6Q4	250	

MISCELLANEOUS

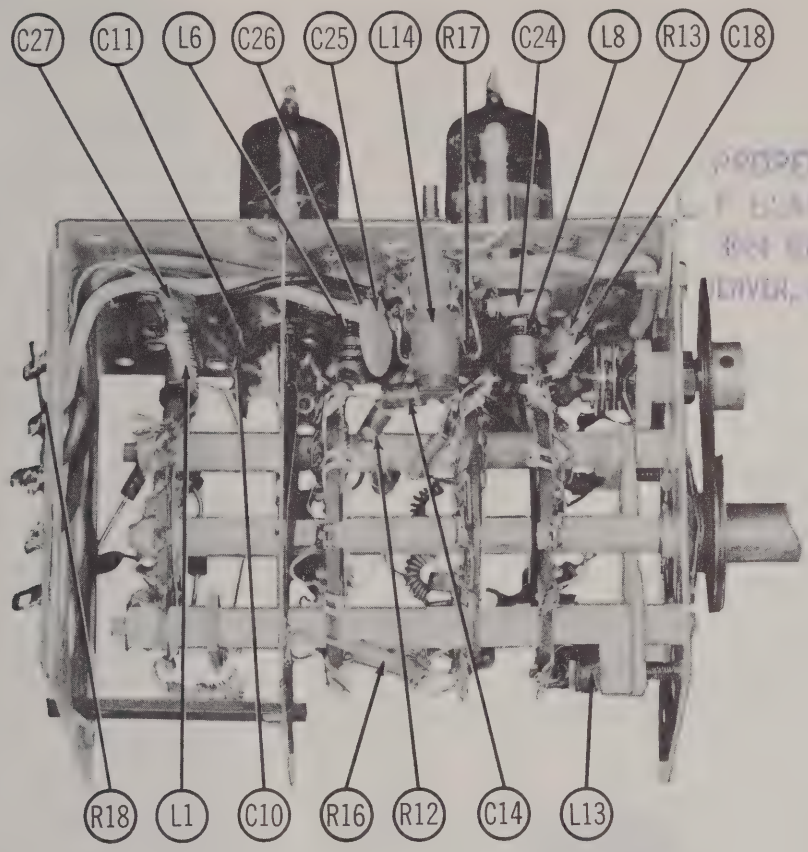
ITEM No.	PART NAME	BENDIX PART No.	NOTES
M3	Tuner	258085-1	VHF-Not used in some versions
	Tuner	258086-1	VHF-Used in some versions.
M4	Centering Device	25A11766-2	Includes deflection yoke (T3) Rear Cover
M5	Ion Trap	274197-13	
	Cabinet	255160-1	Model T2100E
	Cabinet	255169-3	Models T2100M, T2101M
	Cabinet	255172-1	Model K2300
	Cabinet	255172-2	Model K2301
	Knob	269130-1	Contrast & On-Off-Volume
	Knob	269131-1	Brightness & Vert. Hold
	Knob	269132-1	Channel Selector
	Knob	269133-1	Fine Tuning
	Safety Glass	257809-8	Models T2100E, T2100M, K2300
	Safety Glass	257809-9	Models T2101M, K2301
	Mask	269106-2	Models T2100M, T2101M, K2300, K2301
	Mask	269106-3	Model T2100E



CHASSIS TOP VIEW



CHASSIS BOTTOM VIEW- INDUCTOR AND ALIGNMENT IDENTIFICATION



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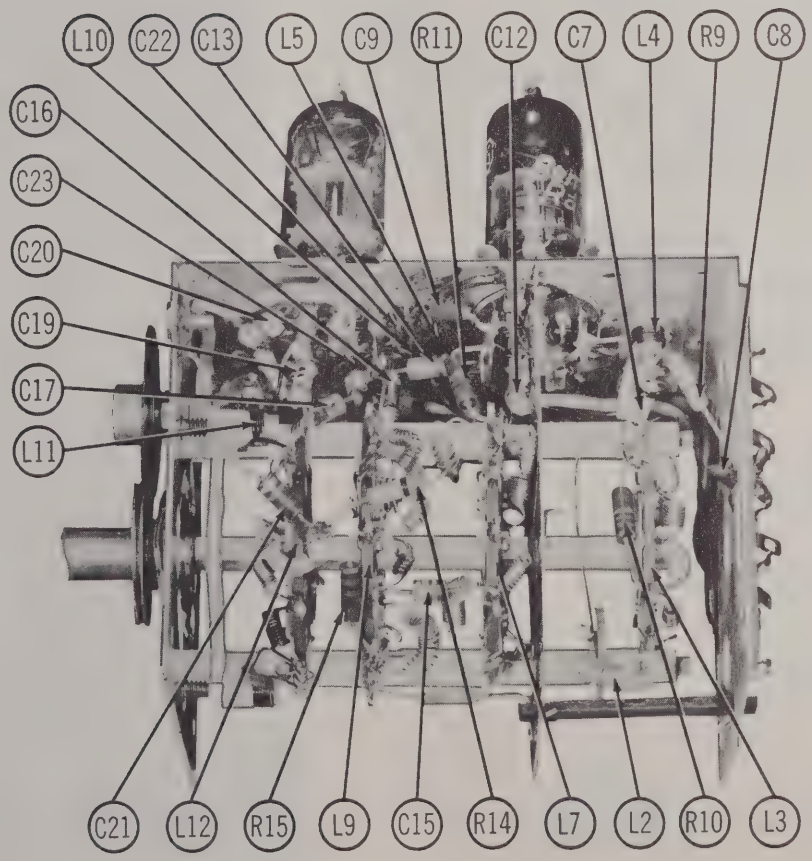
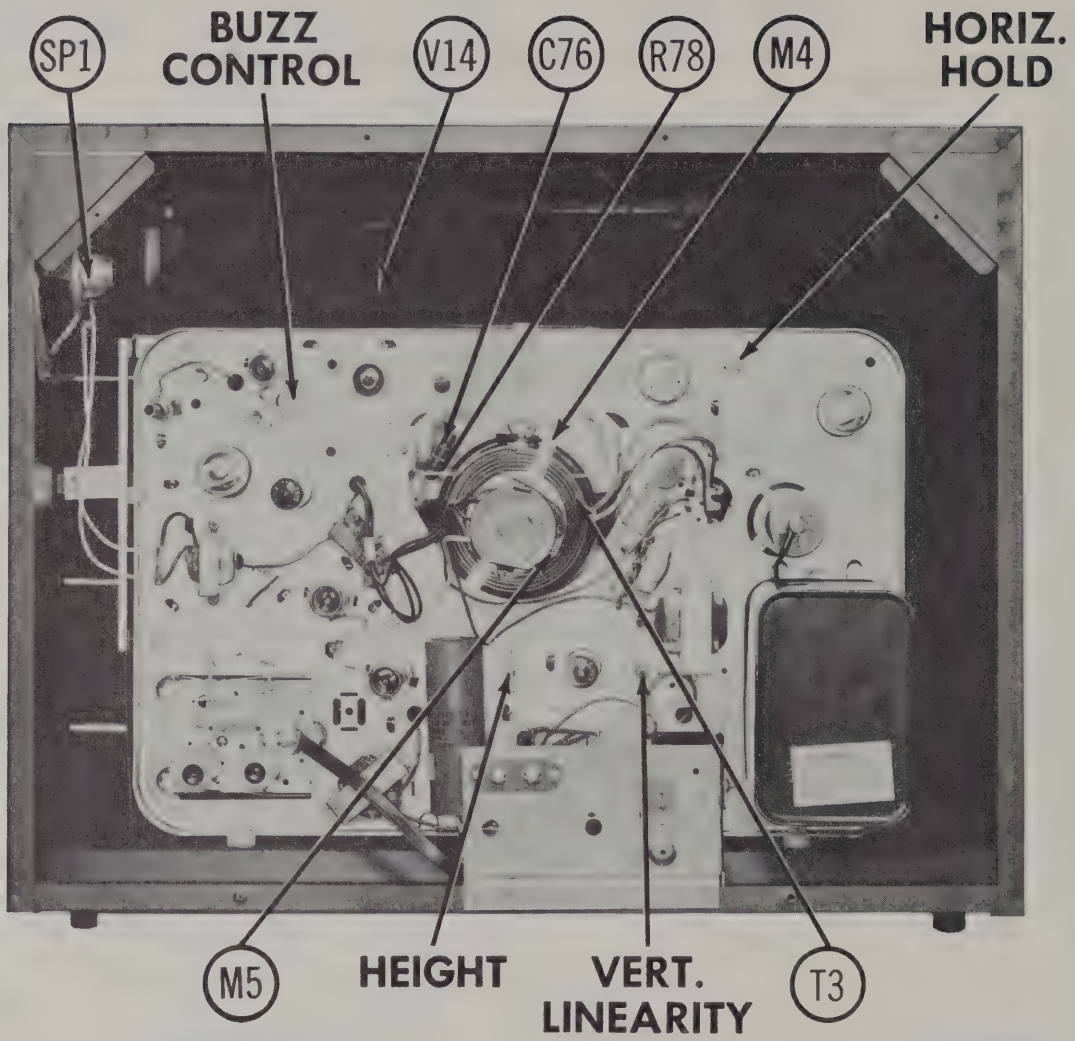
DENVER, COLORADO

RF TUNER-RIGHT SIDE



RF TUNER-LEFT SIDE



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station preferably a test pattern. Adjust the horizontal hold (L23) until the picture synchronizes horizontally. Switch off channel and back again. Picture should now be locked in sync. If not, slightly readjust L23.

PROPERTY OF
E. F. BLANK
DENVER

CORONADO MODELS
RA44-8340A, RA44-8341A

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

CORONADO MODELS
RA44-8340A, RA44-8341A

TRADE NAME	Coronado Models RA44-8340A, RA44-8341A
SUPPLIER	Gamble-Skogmo Inc., 15 N. 8th St., Minneapolis, Minn.
TYPE SET	AC/DC Operated AM Superheterodyne Receiver
TUBES (Five)	Types: 12BE6 Conv., 12BA6 IF Amp., 12AV6 (or) 12AT6 Det. -AVC-AF Amp., 50C5 Output, 35W4 Rectifier
POWER SUPPLY	105-125 Volts AC/DC — RATING . 25 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	540KC-1600KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-.
To set pointer, turn tuning capacitor fully closed and set pointer to last reference mark at low frequency end of dial.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.05MFD	High side to pin 7 (grid) of 12BE6 (V1). Low side to chassis.	455KC (400~ Mod.)	Tuning gang fully open	Across Voice Coil	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.		Loop	1400KC	1400KC	"	A5, A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		"	600KC	600KC	"		Check for tracking.

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PARTS LIST AND DESCRIPTIONS

CORONADO
Model RA44-8340A

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		CORONADO PART No.	STANDARD REPLACEMENT		
V1	Converter	12BE6	12BE6	7CH	
V2	IF Amp.	12BA6	12BA6	7BK	
V3	Det-AVC-AF Amp.	12AV6	12AV6	7BT	12AT6 may be used as an alternate.
V4	Audio Output	50C5	50C5	7CV	
V5	Rect.	35W4	35W4	5BQ	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	CORONADO PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	20	150	23470	PRS150V-40-20-20	BBRT42215	TCT3114	TDL-403020-150	FMT-310	TVA-3448
B	40	150							
C	20	150							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	CORONADO PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C2	.01	400		BPD-01	D6-103	CUB4S1	GP3-333-103	PT411	4TM-S1	
C3	.05	200		BPD-05	DF-503	CUB2S5		PT415	2TM-S5	
C4	250	500		S1250	D6-251	5W5T25	811-251	MC240	1FM-325	
C5	.01	600		BPD-01	D6-103	CUB6S1	GP3-333-103	PT611	6TM-S1	
C6A	10000									
B	250		♦24084	♦PA-112-3	♦PC-80	♦113TM1	♦1404-01		♦T-1	
C										
C7	.01	600		BPD-01	D6-103	CUB6S1	GP3-333-103	PT411	6TM-S1	
C8	.05	200		BPD-05	DF-503	CUB2S5		PT415	2TM-S5	
C9	.05	400		BPD-05	DF-503	CUB4S5		PT415	4TM-S5	
C10	.05	400		BPD-05	DF-503	CUB4S5		PT415	4TM-S5	

♦ Items C6A, C6B, C6C, R9A and R9B are combined in one unit. When replacing items separately, items C6B and C6C should total 250MMF.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	CORONADO PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	1Meg	1/2	23468	AB-744	A47-1Meg-Z	Q13-137	U-53	Volume
B	Shaft		Not Req.	AK-4	KSS-3	Not Req.	Not Req.	Attach to R1A.
C	Switch		Not Req.	KB-1	SWE-12	76-1	US-26	Attach to R1A.

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	CORONADO PART No.	IRC PART No.	
R2	22KΩ	1/2		BTS-22K	
R3	1Meg 5%	1/2		BTS-1Meg	
R4	47Ω 5%	1/2		BTS-47	
R5	2.2Meg	1/2		BTS-2.2Meg	
R6	4.7Meg	1/2		BTS-4.7Meg	
R7	2200Ω	1/2		BTS-2200	
R8	470Ω	1/2		BTS-470	

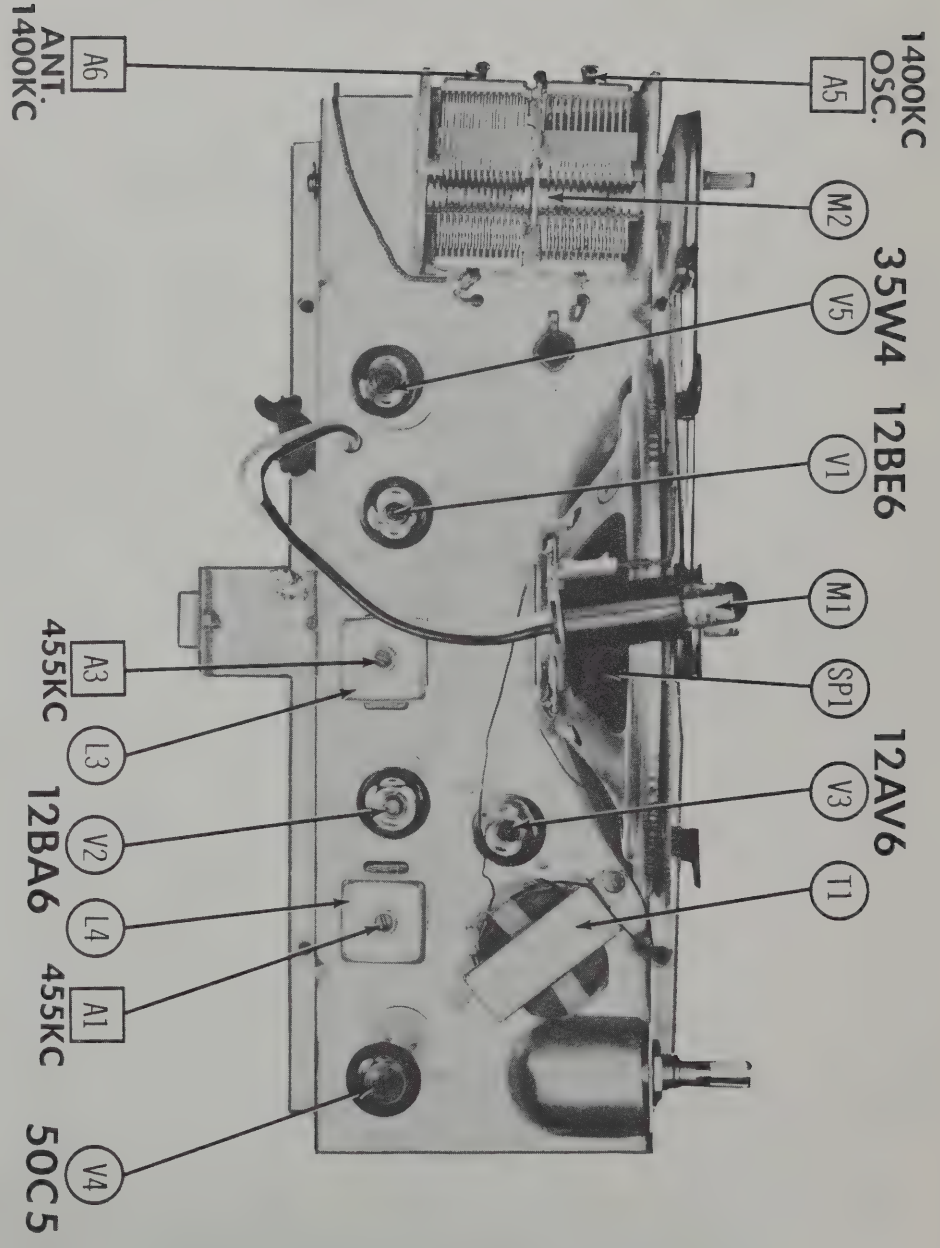
ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	CORONADO PART No.	IRC PART No.	
R9A	500KΩ	1/2	♦24084	BTS-470K	
B	500KΩ	1/2		BTS-470K	
R10	120Ω	1/2		BTS-120	
R11	1200Ω	1		BTA-1200	
R12	120Ω	1		BTA-120	
R13	15Ω	1/2		BTS-15	
R14	150Ω	1/2		BTS-150	
R15	330KΩ	1/2		BTS-330K	

♦ Items C6A, C6B, C6C, R9A, R9B are combined in one unit.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	CORONADO PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	2.3KΩ	3.5Ω	23464-1	Z1101	A-3025	A-3332	26S58 ①	S-12X	① Drill one new mtg. hole.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

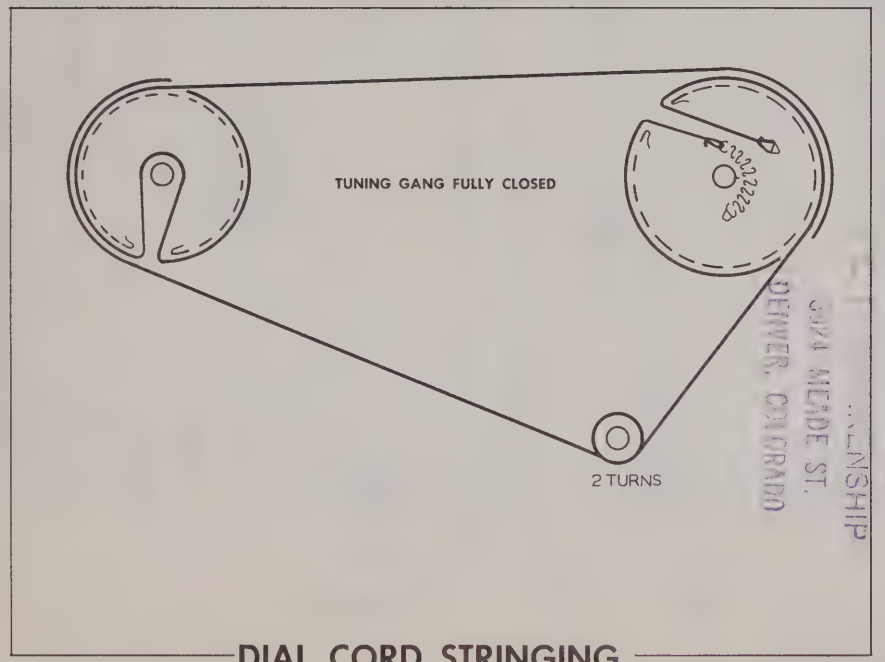
ITEM No.	RATINGS			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	CORONADO PART No.	QUAM PART No.	
SP1	5"	PM	3.5Ω	23467	5A1	

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	CORONADO PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Loop Ant.	2Ω		23465				Includes cabinet back
L2	Osc. Coil	.6Ω	7Ω	24210	14-1073*		69-Osc.	
L3	Input IF	21Ω	21Ω	21797-16	16-6758	BC-352	12-C1	
L4	Output IF	21Ω	21Ω	21797-16	16-6758	BC-353	12-C2	

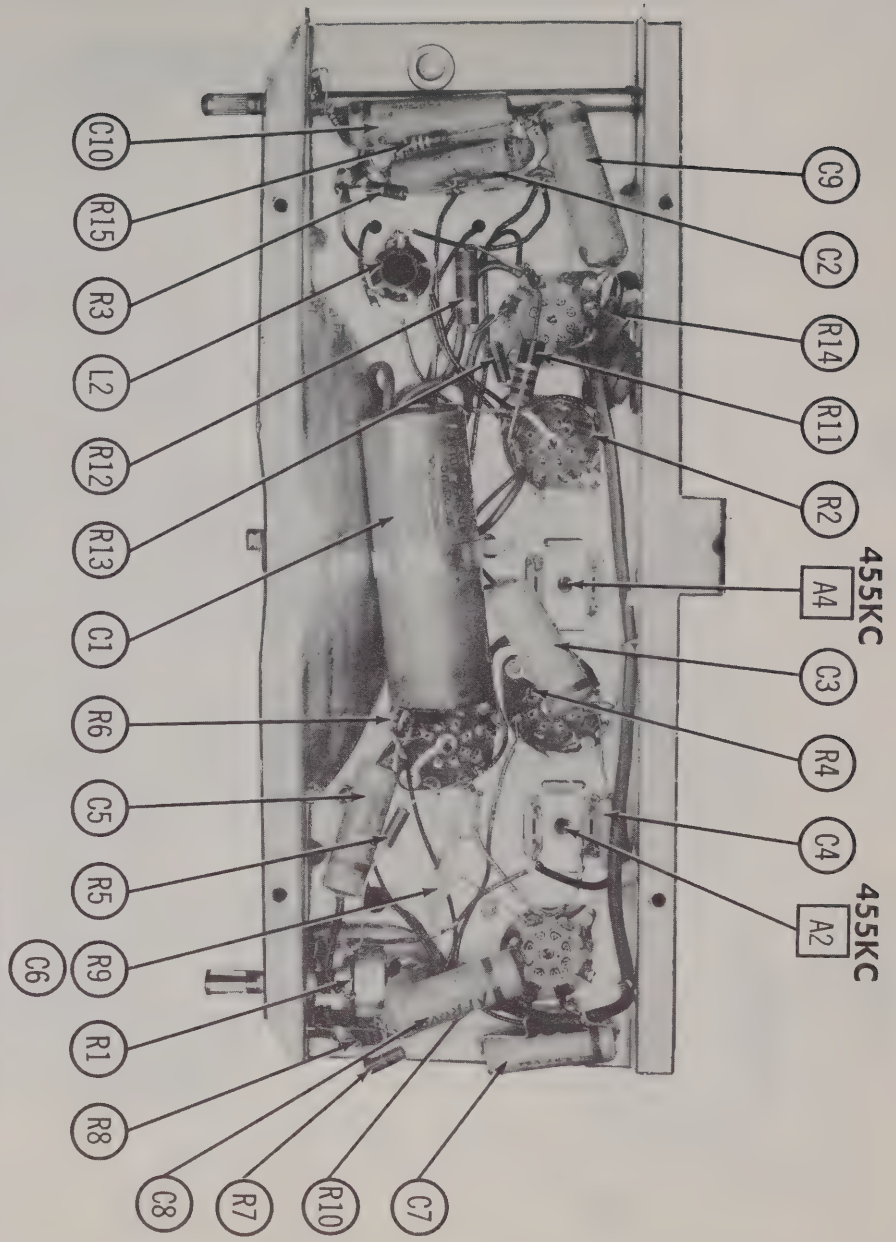
MISCELLANEOUS

ITEM No.	PART NAME	CORONADO PART No.	NOTES
M1	Dial Light	19351	#47
M2	Tuning Cap.	24209	2 Gang (19-445MMF, 23-170MMF)
	Cabinet	23499-9	Willow Green
	Cabinet	23499-10	Ivory
	Knob	23453-1	On-off-volume & tuning
	Dial Pointer	23461	



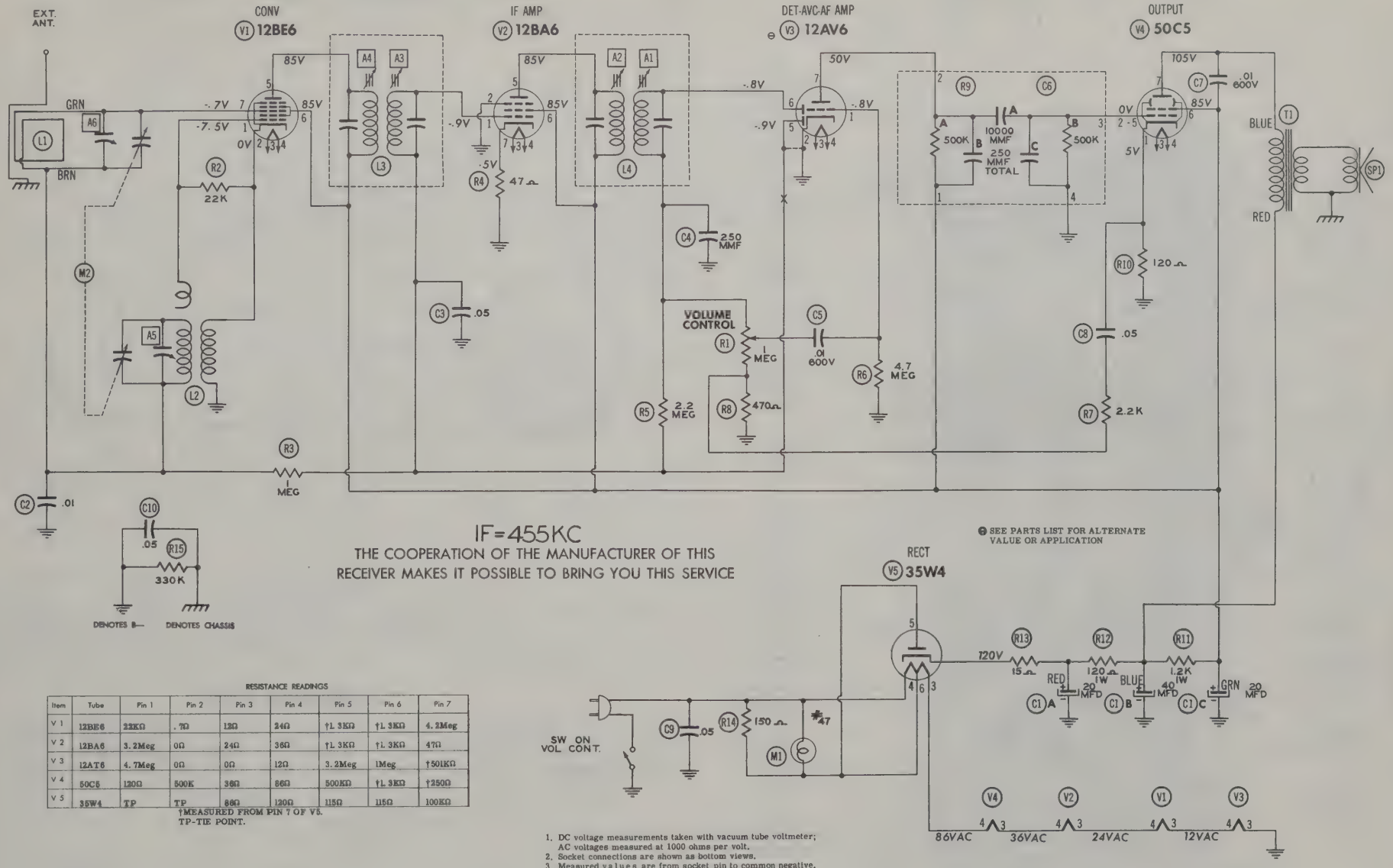
DIAL CORD STRINGING

CHASSIS—BOTTOM VIEW



3424 MEADE ST.
DENVER, COLORADO

CORONADO
Model RA44-8340A



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BE6	22KΩ	.7Ω	12Ω	24Ω	†1.3KΩ	†1.3KΩ	4.2Meg
V 2	12BA6	3.2Meg	0Ω	24Ω	36Ω	†1.3KΩ	†1.3KΩ	47Ω
V 3	12AT6	4.7Meg	0Ω	0Ω	12Ω	3.2Meg	1Meg	†501KΩ
V 4	50C5	120Ω	500K	36Ω	86Ω	500KΩ	†1.3KΩ	†250Ω
V 5	35W4	TP	TP	86Ω	120Ω	115Ω	115Ω	100KΩ

†MEASURED FROM PIN 7 OF V5.
TP-TIE POINT.

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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[illegible] MADE ST.
DENVER, COLORADO

FAIRCHILD
MODEL 255

TRADE NAME	Fairchild Model 255
MANUFACTURER	Fairchild Recording Equip. Co., 154th St. & Powells Cave Blvd., Whitestone 57, N. Y.
TYPE SET	AC Operated 25 Watt Audio Amplifier
TUBES (Five)	Types: 6AB4 AF Amp., 12AU7 AF Amp. -Phase Inv., (2) 6L6 (or) 6L6G, 6L6GB, 1614, 5881 Output, 5V4GA Rectifier
POWER SUPPLY	110-120 Volts AC-60 Cycles RATING .47 Amp. @ 117 Volts AC

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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PARTS LIST AND DESCRIPTIONS

FAIRCHILD
Model 255

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		FAIRCHILD PART No.	STANDARD REPLACEMENT		
V1	AF Amp.	6AB4	6AB4	5CE	
V2	AF Amp. - Phase Inv.	12AU7	12AU7	9A	
V3	Audio Output	6L6	6L6	7AC	Note: V3 and V4 may be interchanged with 6L6GB, 6L6G, 1614, or 5881.
V4	Audio Output	6L6	6L6	7AC	
V5	Rect.	5V4GA	5V4GA	5L	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	FAIRCHILD PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	■40	450		AFH4-93	D092	FP428.4	TM-4030	Q-325	TVL-4720
B	▲40	450							
C	30	350							
D	▲30	350							
C2	20	150		PRS150V-20	BR2015	TC45	TD-20-150	FM-1520	TVA-1410
C3	20	150		PRS150V-20	BR2015	TC45	TD-20-150	FM-1520	TVA-1410

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	FAIRCHILD PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C4	.25	400		P488N-25		CUB4P25		PT4025	4TM-P25	
C5	.25	200		P288N-25		CUB2P25		PT4025	2TM-P25	
C6	.25	400		P488N-25		CUB4P25		PT4025	4TM-P25	
C7	.25	400		P488N-25		CUB4P25		PT4025	4TM-P25	
C8	50			S150	D6-500	TP30	GP1K-500	UC-545	5GA-Q5	
C9	.015	600		BPD-015	DD16-153	CUB6S15		PT6115	6TM-S15	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	FAIRCHILD PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	100KΩ	½		AB-40	A47-100K-S	Q11-128	U-41	Gain
B	Shaft			AK-4	FKS-½	Not Req.	Not Req.	Attach to R1A.
R2A	100KΩ	½		AB-40	A47-100K-S	Q11-128	U-41	Balance
B	Shaft			AK-4	FKS-½	RQ	Not Req.	Attach to R2A.
R3A	10KΩ	½		AB-14	A47-10K-S	Q11-116	U-20	Bias
B	Shaft			AK-4	FKS-½	RQ	Not Req.	Attach to R3A.

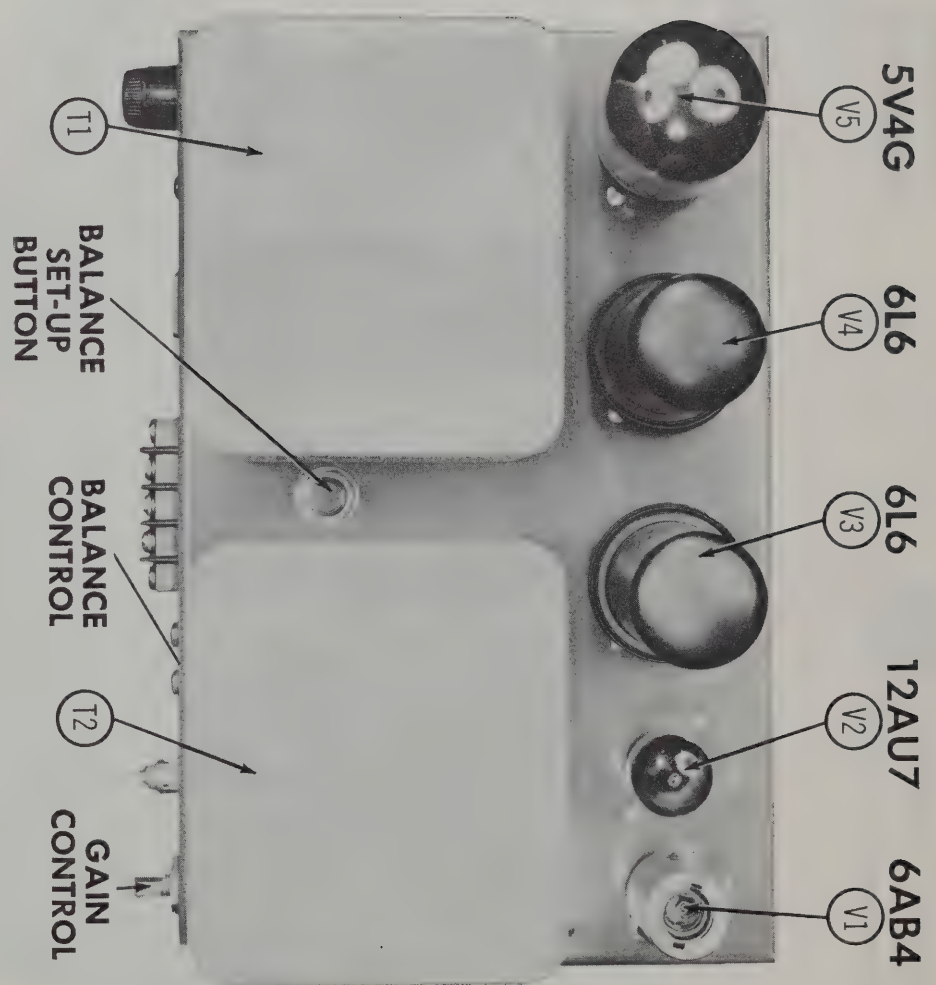
RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	FAIRCHILD PART No.	IRC PART No.	
R4	270KΩ	½		BTS-270K	
R5	1500Ω	½		BTS-1500	
R6	220KΩ	½		BTS-220K	
R7	220KΩ	1		BTA-220K	
R8	6200Ω 5%	½		BTS-6200 5%	
R9	45KΩ 1%	1			Note 1, 2
R10	45KΩ 1%	1			Note 1, 2
R11	100KΩ	½		BTS-100K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	FAIRCHILD PART No.	IRC PART No.	
R12	100KΩ	½		BTS-100K	
R13	39KΩ	½		BTS-39K	
R14	75Ω	5		PW7-75	
R15	15KΩ	1		BTA-15K	
R16	27KΩ	½		BTS-27K	
R17	10KΩ	½		BTS-10K	
R18	39KΩ	½		BTS-39K	Note 3
R19	8200Ω	½		BTS-8200	

Note 1. Some versions use a 43KΩ 1W 1% resistor in this application.
Note 2. Mfgr. states must be match pair, 2% of each other.
Note 3. Some versions use a 33KΩ ½W resistor in this application.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	FAIRCHILD PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC @ .47A	640VCT @ .170ADC Tap @ 80VAC .002ADC	5VAC @ 3A	6.3VAC @ 2.3A	D21743-1					

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE			REPLACEMENT DATA					NOTES
	PRI.	SEC.		FAIRCHILD PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	3.8KΩ CT	16Ω Tap @ 8Ω		D21742-1						

SELENIUM RECTIFIER

ITEM No.	RATING		REPLACEMENT DATA					NOTES
	CURRENT	FAIRCHILD PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	RADIO RECEPTOR PART No.	SARKES TARZIAN PART No.	
M1	.002ADC		1263A	RS050	8S20	8Y1	60	

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA						NOTES
			FAIRCHILD PART No.		LITTELFUSE PART No.		BUSS PART No.		
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER	
M2	3AG	2A 250V			312002. (3AG 2A)	342001	HGC2	HKP	

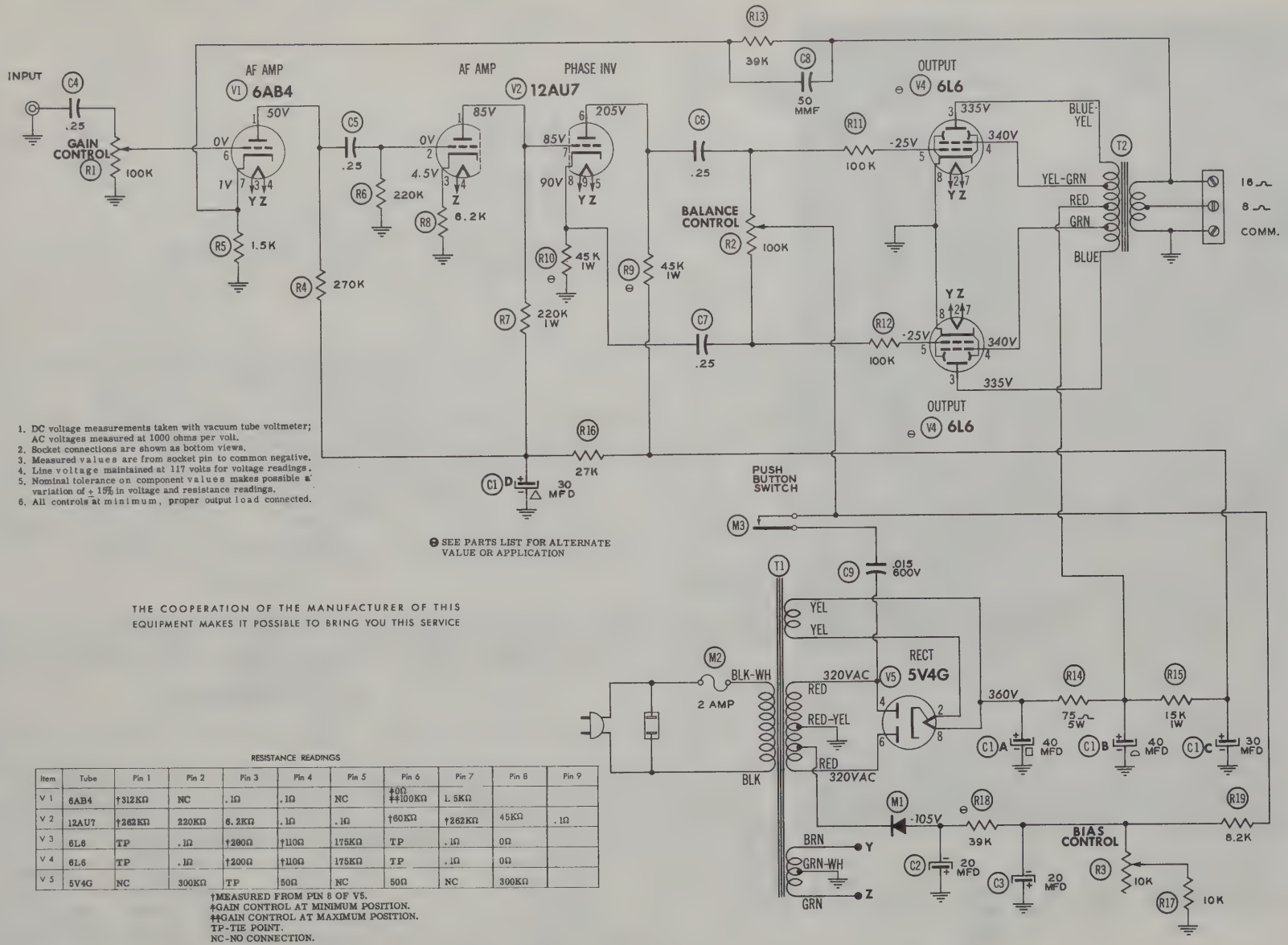
MISCELLANEOUS

ITEM No.	PART NAME	FAIRCHILD PART No.	NOTES
M3	Switch		Push button-Balance set-up adjustment

CHASSIS—BOTTOM VIEW

OF
LANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

FAIRCHILD
Model 255



1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

THE COOPERATION OF THE MANUFACTURER OF THIS EQUIPMENT MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AB4	†312KΩ	NC	.1Ω	.1Ω	NC	‡0Ω ‡‡100KΩ	1.5KΩ		
V 2	12AU7	†262KΩ	220KΩ	6.2KΩ	.1Ω	.1Ω	†60KΩ	†262KΩ	45KΩ	.1Ω
V 3	6L6	TP	.1Ω	†200Ω	†110Ω	175KΩ	TP	.1Ω	0Ω	
V 4	6L6	TP	.1Ω	†200Ω	†110Ω	175KΩ	TP	.1Ω	0Ω	
V 5	5V4G	NC	300KΩ	TP	50Ω	NC	50Ω	NC	300KΩ	

†MEASURED FROM PIN 8 OF V5.
‡GAIN CONTROL AT MINIMUM POSITION.
‡‡GAIN CONTROL AT MAXIMUM POSITION.
TP-TIE POINT.
NC-NO CONNECTION.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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F-M-E (FEDERAL)
MODELS 37-C, 47-A

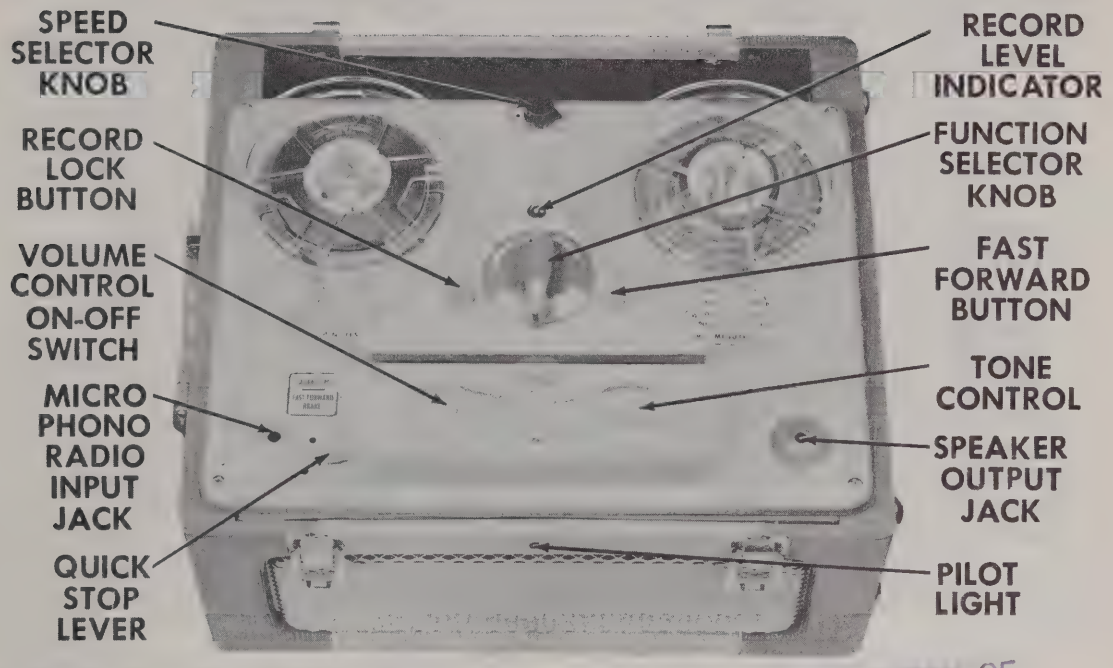

Figure 1. Model 37-C

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L. F. BLANKENSHIP
3024 MEADE ST.
DENVER, COLORADO

GENERAL INFORMATION

F-M-E Tape Recorder Models 37-C and 47-A are electrically and mechanically similar. Electrically, Model 47-A utilizes a Monitor Hi-Fi Output Jack whereas Model 37-C does not have this feature. Mechanically, Model 47-A employs a tape counter, and different colored panels and controls. For other variations in the two units refer to the exploded view and parts list.

Both models are two speed (3 3/4 and 7 1/2 I. P. S.) recorders with capstan drive. A mechanical control engages the tape with the capstan and positions the tape to the head. This control is also used to actuate an electrical switch to transfer the amplifier circuits from "Play" to "Record".

These F-M-E Recorders are designed to record and play back two tracks of material on standard recording tape with no loss of frequency response or quality. Recordings can be made from a radio, television receiver or phonograph, in addition to those made directly from the microphone. Recordings can be played through the self-contained speaker or an external speaker may be used through use of the jack labeled "Speaker-Output".

Models 37-C and 47-A are designed to operate on 60 cycle, 110-120 volts, AC supply only. Before connecting to your line supply be absolutely certain that it agrees with the above specifications.

Federal Manufacturing & Engineering Corp.
1055 Stewart Avenue
Garden City, N. Y.

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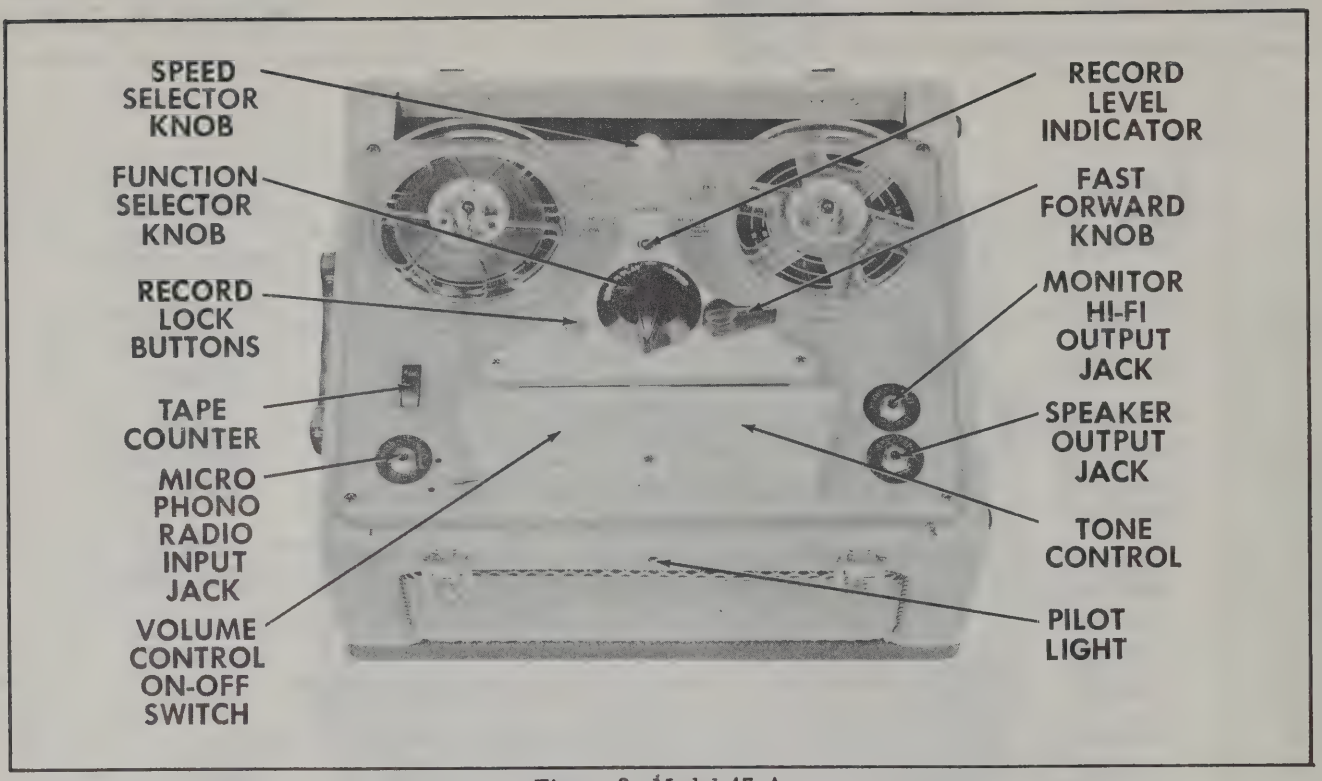

Figure 2. Model 47-A

OPERATING POSITION

Place the recorder on a table or on any other hard, smooth surface. Do not place it on a soft, yielding material such as a rug, since this might come into contact with the ventilator opening at the bottom of the case, and impede the free circulation of air. The storage compartment should be emptied in order to obtain maximum ventilation.

OPERATING INSTRUCTIONS

1. With selector knob (4) and the "Volume Control Knob" in the "Off" position, insert the AC cord plug in a convenient wall receptacle of the proper rating.

Threading The Tape-

With selector knob (4) in the "Off" position, place an empty reel on the right hand (take-up) spindle. Place a loaded reel of tape on the left hand (supply) spindle so that it unwinds counterclockwise. Unreel about ten inches of tape from the supply reel for ease of threading the machine. Thread tape, following threading slot between the two plastic escutcheons. Make sure that the tape is not twisted, and that it passes in front of the recording head and the tape guide stud, and in back of the pressure roller. Insert the free end of the tape into the hub slot of the take-up reel, then wind the reel one or two times counterclockwise to take up all slack.

NOTE: Make certain that the glossy (or uncoated) side of the tape faces the front of the recorder.

To Record-

1. Insert the microphone plug into the input jack labeled "Micro".

2. With selector knob (4) in the "Off" position, set speed selector knob (3) in the desired position.

3. While pressing down firmly on record lock button (10), turn selector knob (4) to "Record" position. Then release record lock button (10). This button insures against accidental erasure of any recording which may already be on the tape.

4. While talking into the mircophone, adjust the "Volume" control until the Neon Recording Indicator just begins to flicker.

NOTE: Correct recording volume is very important. Too weak a signal, which does not cause the Recording Indicator to flash, will result in weak playback and high background noise, Too strong a signal, causing the Recording Indicator to glow steadily, will result in distortion during playback.

5. The "Tone Control" should be set at full treble position when recording.

To Record From Radio, TV Or Phonograph-

Recordings can be made from a radio or television receiver, or phonograph, by placing the microphone near the speaker of such instruments. However, this type of recording may not be satisfactory as other sounds may be picked up by the microphone which, as a result, will be recorded on the tape. A superior quality recording can be made by use of a radio-phono attachment cord. Connect attachment cord as follows:

1. The two alligator clips at one end of the attachment cord are connected across the voice coil terminals on the radio, television or phonograph speaker, while the plug at the other end is inserted into the input jack labeled "Micro".

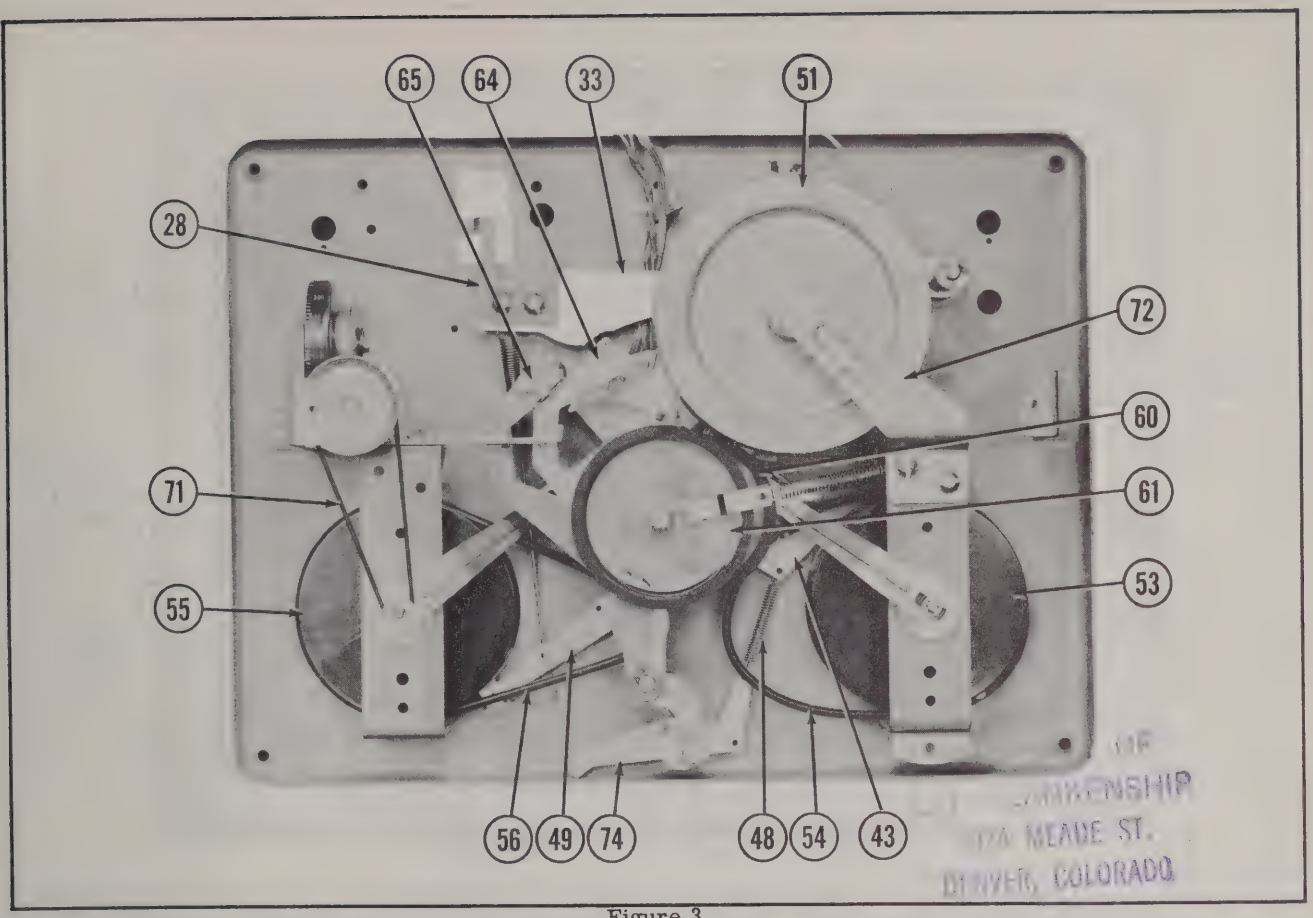

Figure 3

2. After tuning in the desired program proceed with the recording as described under "To Record".

Dual Track Recording-

The F-M-E is designed so that only 1/2 the tape width is recorded at a time, thereby resulting in two track recording. This two track operation is accomplished in the following manner:

1. After a reel of tape has been recorded; i. e. all the tape wound onto the right hand reel, turn selector knob (4) to "Off" position.

2. Remove the reels from the recorder, turning the full reel over and placing it on the left hand spindle.

3. Properly thread the tape and proceed with the recording.

4. After the second track has been recorded the first track of recording is ready to be played, without rewinding, by reversing the reels as described in Step #2 above.

To Edit And Splice Tape-

NOTE: Since it is impossible to edit and splice one track without affecting the other, recordings which are to be edited should be limited to one track only.

1. The tape may be edited by cutting out unwanted portions, or by joining selections into another sequence. Announcements may be inserted between selections, etc. Unused sections of tape can be spliced together for re-use.

2. For best results, cut tape at 60° angle with an overlap so ends will line up, join ends together with splicing tape on the glossy side and trim off any excessive width.

To Play Recordings-

1. Thread the tape as described under "Threading The Tape".

2. Turn the "Off-Volume" control clockwise until a click is heard and allow a few seconds for the tubes to warm up.

3. Turn selector knob (4) to "Play" position and adjust the "Volume" and "Tone" controls for desired listening level.

To Rewind-

To rewind a tape, turn selector knob (4) to "Rewind" position. To stop rewinding, turn selector knob (4) to "Off" position.

CAUTION: Do not turn selector knob (4) from "Rewind" to "Play" without stopping briefly at "Off", or the tape may break.

Fast Forward-

When playing back, any subsequent portion of the sound track can be quickly located without having to play

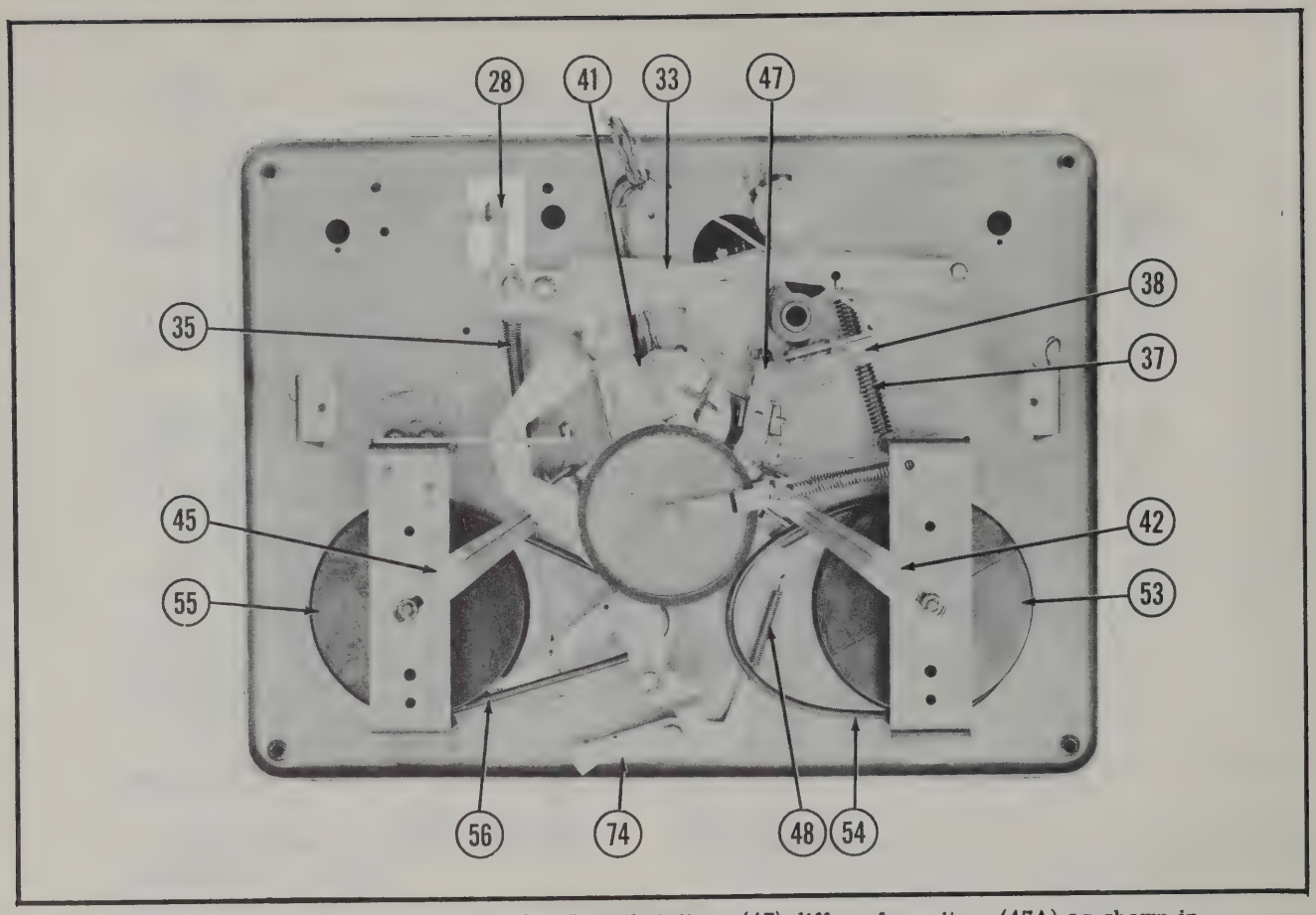

Figure 4. Underside of Model 37-C. Note that item (47) differs from item (47A) as shown in Figure 5. Otherwise, with the exception of items (70, 71, and 80) which are common to Model 47-A, these mechanical units are identical.

back the intervening portion.

Model 37-C: Pull the quick stop lever (28) forward all the way, and while holding in this position, press down on fast forward button (9); the take-up reel will revolve at a greatly increased rate of speed so long as button (9) is held down. To stop the action of Fast Forward , first release fast forward button (9), and then release quick stop lever (28). The tape will then again be transported at the normal rate.

Model 47-A: Turn the fast forward control knob (9A) to the "Fast Forward" position. To stop the action of the fast forward, turn fast forward control knob (9A) to the "Pause" position, hold for a moment, then proceed on to the "Record-Play" position.

Quick Stop Lever-

To stop the movement of the reels at any time while the recorder is in operation, for editing, dictating or any other purpose, pull quick stop lever (28) forward all the way. As long as the lever is held in this position, the reels will not turn.

External Speaker-

An external speaker jack (labeled "Spkr") is provided to permit the use of an external speaker. This jack accepts a standard phone plug. The external PM speaker should preferably be a 3.2 ohm speaker.

Monitor-Hi-Fi Output Jack-(Model 47-A Only)-

Monitoring: Listening to a recording as it is being made is called monitoring. To monitor a recording on Model 47-A, connect a high impedance crystal type earphone into the Monitor-Hi-Fi Output Jack.

To Use External Amplifier: The Monitor-Hi-Fi Output Jack can be utilized to connect the recorder with an external high fidelity power amplifier (without a pre-amplifier). This output jack by-passes the play-back amplifier output stage and enables the recorder to be used as a pre-amplifier. The output impedance at the jack is approximately 500,000 ohms, and the input of the power amplifier should be matched to that impedance. In making the connection between the recorder and the external amplifier, a standard shielded phone plug and shielded cable should be used, in order to minimize hum.

CAUTION: When using the recorder as part of a hi-fi system, a standard telephone plug should be inserted into the Speaker Output Jack , in order to disconnect the internal speaker . If the recorder is to remain a permanent part of the hi-fi system, it is desirable to connect a 4 ohm, 5 watt resistor across the telephone plug, to act as a dummy load, thus minimizing any possible damage to the output tube of the recorder.

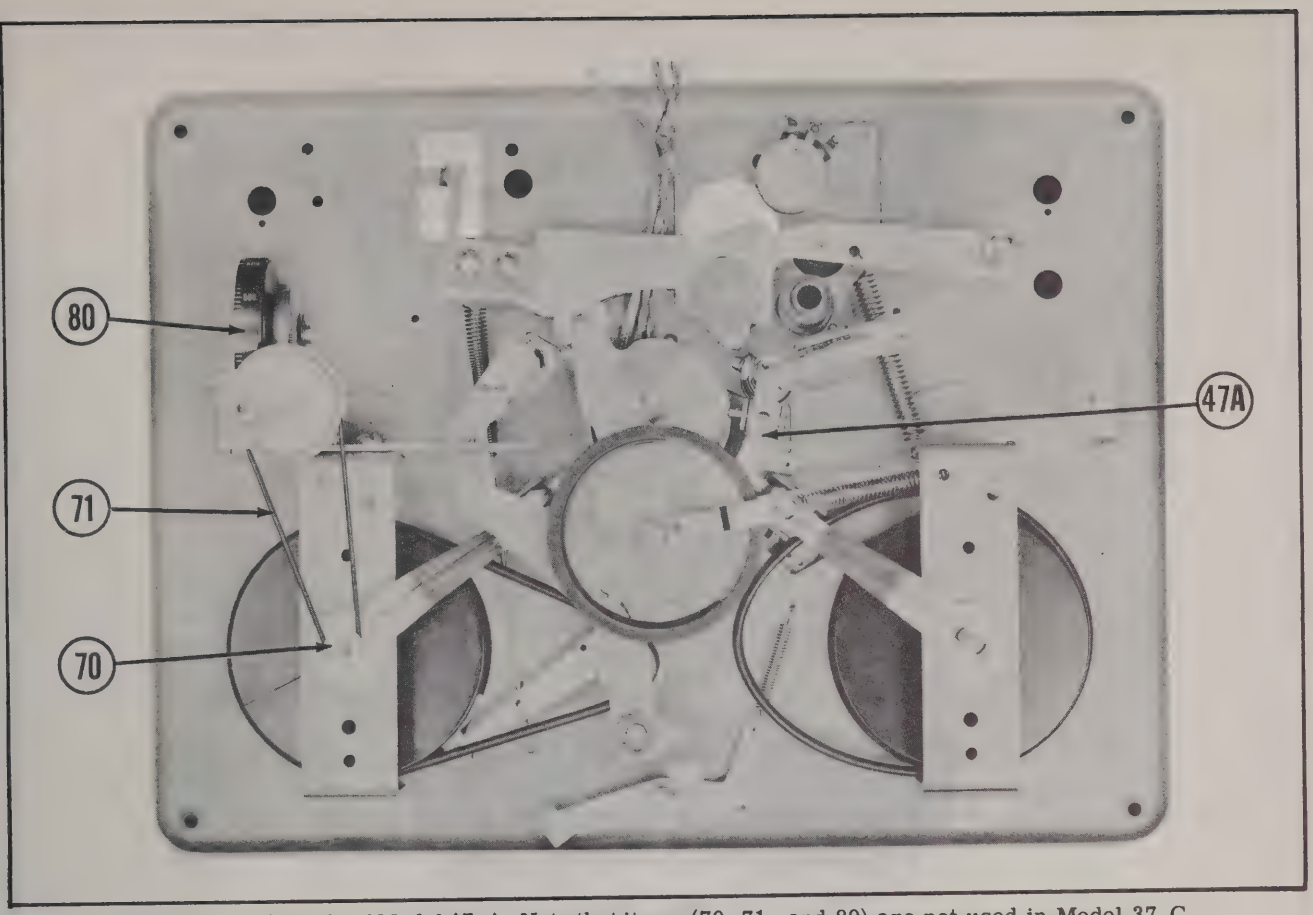

Figure 5. Underside of Model 47-A. Note that items (70, 71, and 80) are not used in Model 37-C. Otherwise, with the exception of items (47 and 47A), these tape transport mechanism are identical.

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DISASSEMBLY INSTRUCTIONS

Removal From Case-

To remove the recorder from the case first remove the power cord, then remove two screws located on the underside of the recorder. Next, remove the 4 Phillips head screws located at each corner of the main panel. Lift the entire recorder out of the case and disconnect the speaker leads at the loudspeaker terminals, marking the black wire so that it can be replaced in the same connector.

Removal of Amp. From Transport Mech. -

Before removing the amplifier chassis from the mechanism panel, all cables and wires must be removed from their clamps. The speed selector switch should be turned to the midway position between the 3.75 & 7.50 speeds. The micro jack box assembly must be removed from the mechanism panel. Place the recorder down with the motor facing upward. The chassis is mounted by two 8-32 screws and four 10-32 screws. On Model 47-A, the counter belt should be removed before the amplifier chassis is separated from the mechanism panel. After these screws are removed the amplifier chassis must be lifted straight upward upward until the cam shaft clears both wafer switches. The amplifier chassis can then be turned over and repairs can be made on the mechanism panel.

ADJUSTMENTS

Play-Record-Erase Head Alignment Adjustment-

It is very important that the head be lined up perfectly with the tape. If it is not, low output, loss of high frequencies or track overlap may result.

IMPORTANT: Before attempting to adjust the head make certain that the bottom of tape guide (31) clears the baseplate by 3/16". If not, turn tape guide (31) until this clearance exists. Apply a drop of glyptol to top of tape guide to lock tape guide in place. If the head still requires adjustment, proceed as follows:

Obtain a tape on which a 3,000 cycle signal has been recorded. This can be recorded on a good unit. Place this tape on the unit that the head is to be aligned on. Connect an output meter or AC voltmeter across the speaker voice coil. Play the 3,000 cycle tape, rock the head holder back and forth, turning screw (20) will allow you to do this, and notice a variation in the output voltage at the voice coil. Stop turning screw (20) when the highest meter reading is obtained.

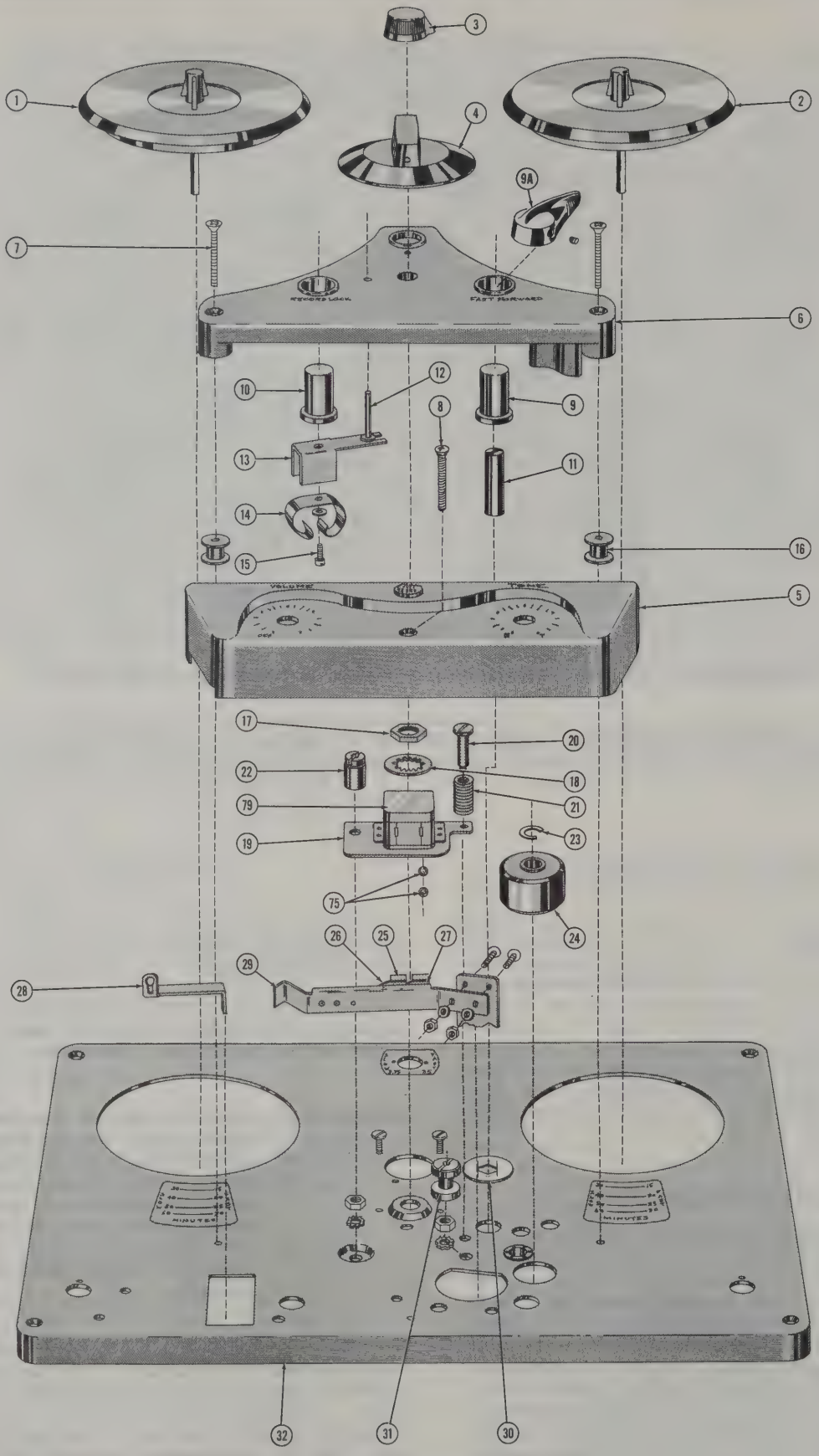

Figure 6A. Exploded View Of Parts Above Baseplate.

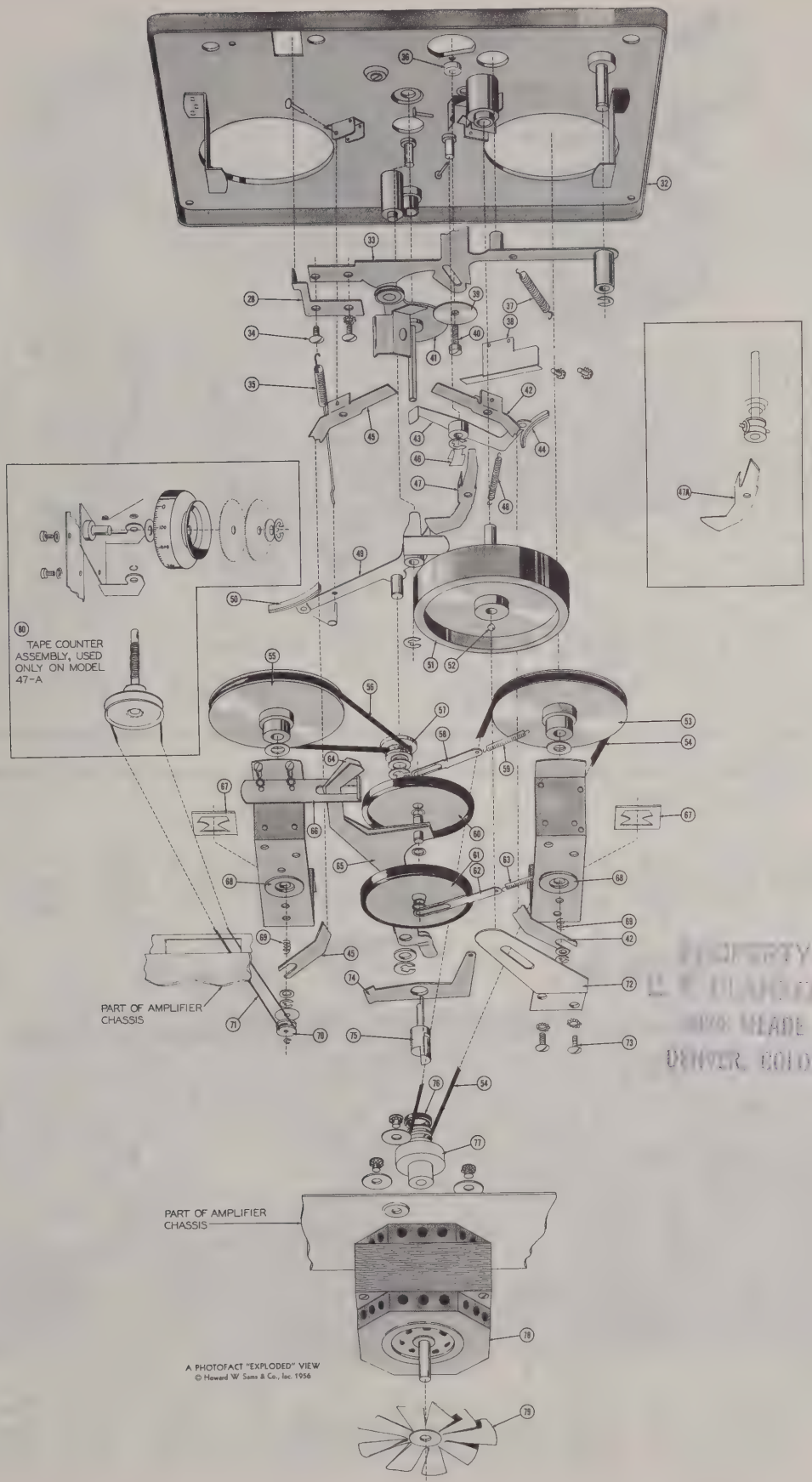
TAPE COUNTER ASSEMBLY, USED ONLY ON MODEL 47-A
PART OF AMPLIFIER CHASSIS
PART OF AMPLIFIER CHASSIS
A PHOTOFACT "EXPLODED" VIEW
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Figure 6B. Exploded View Of Parts Below Baseplate.

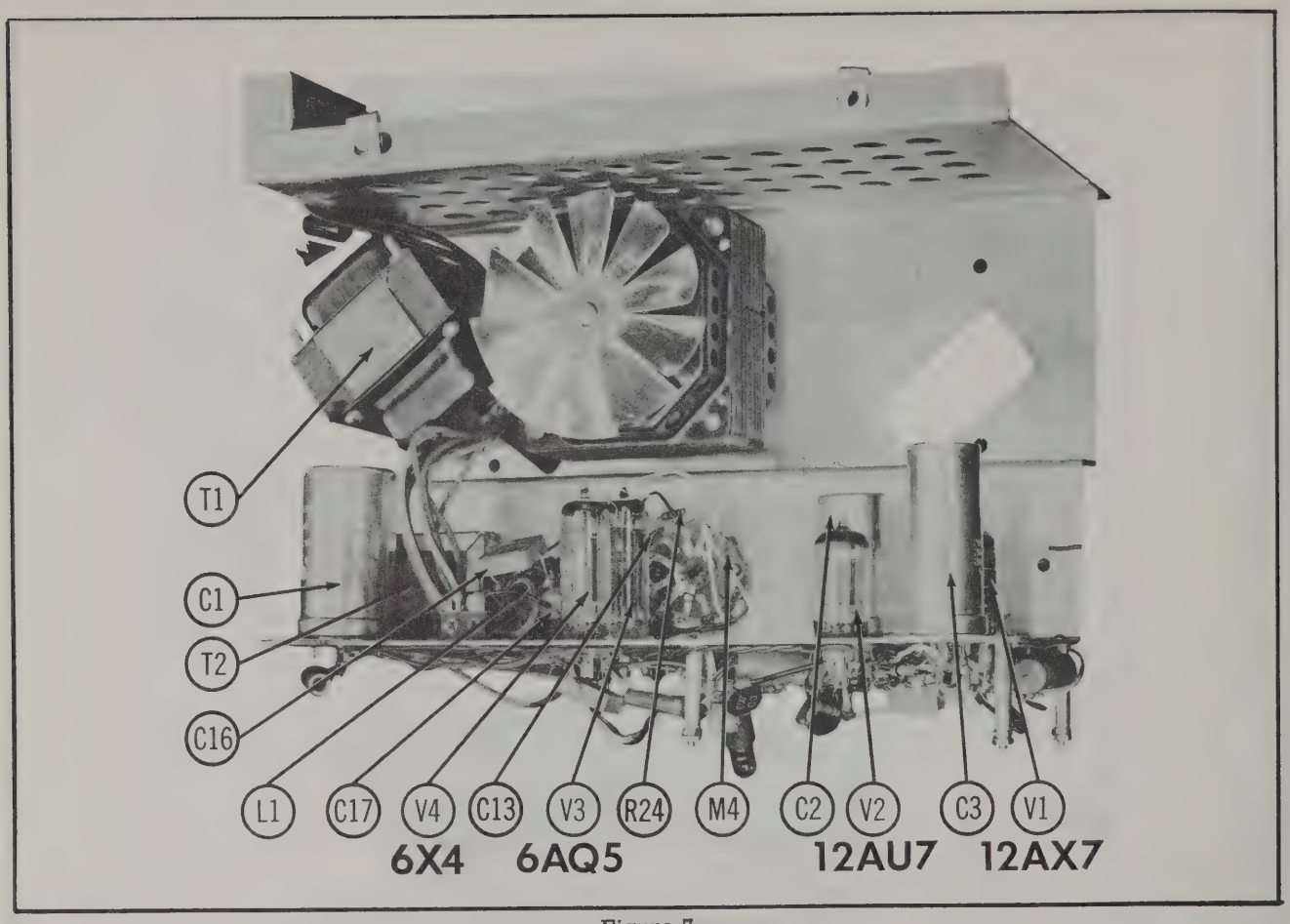


Figure 7

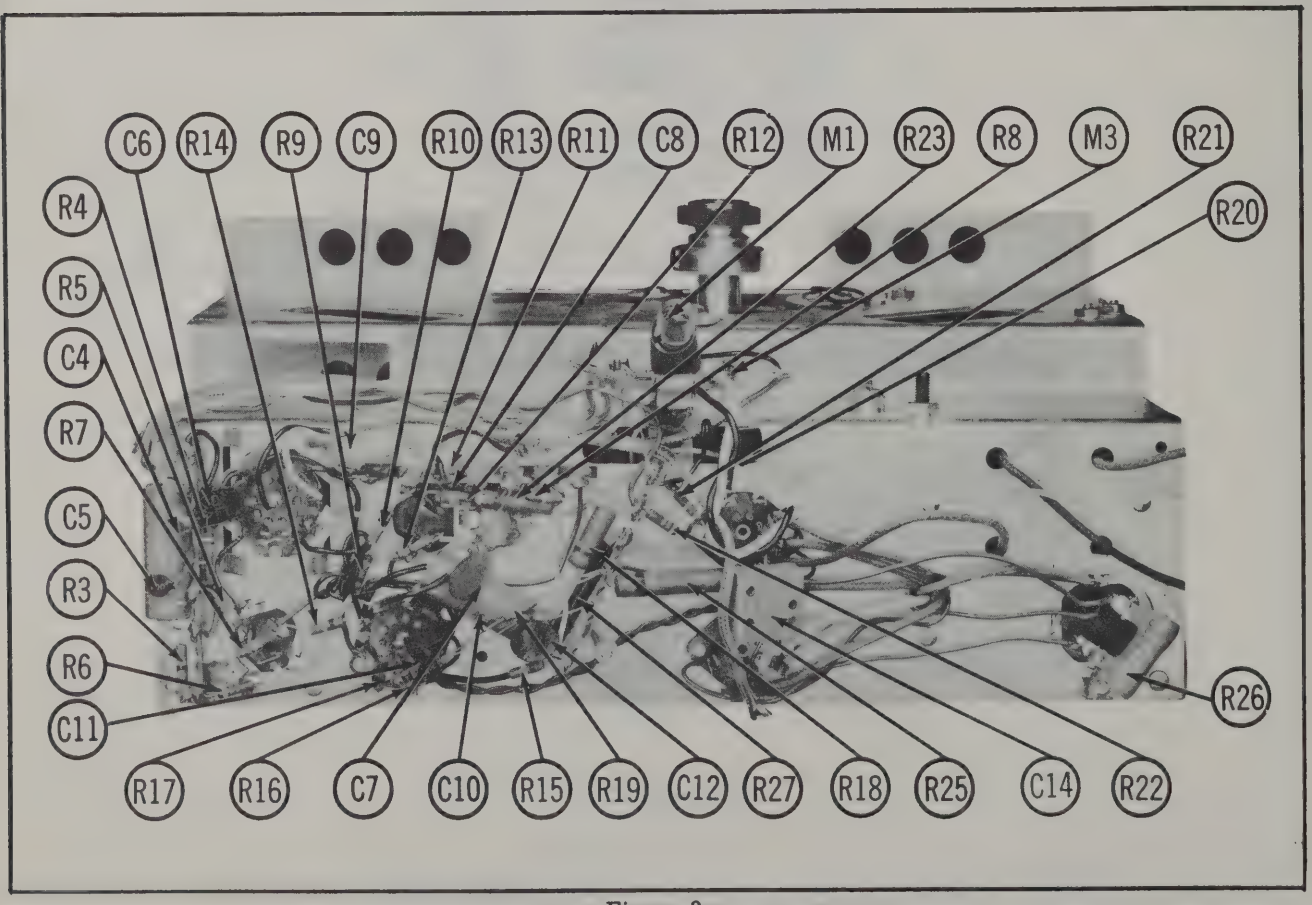
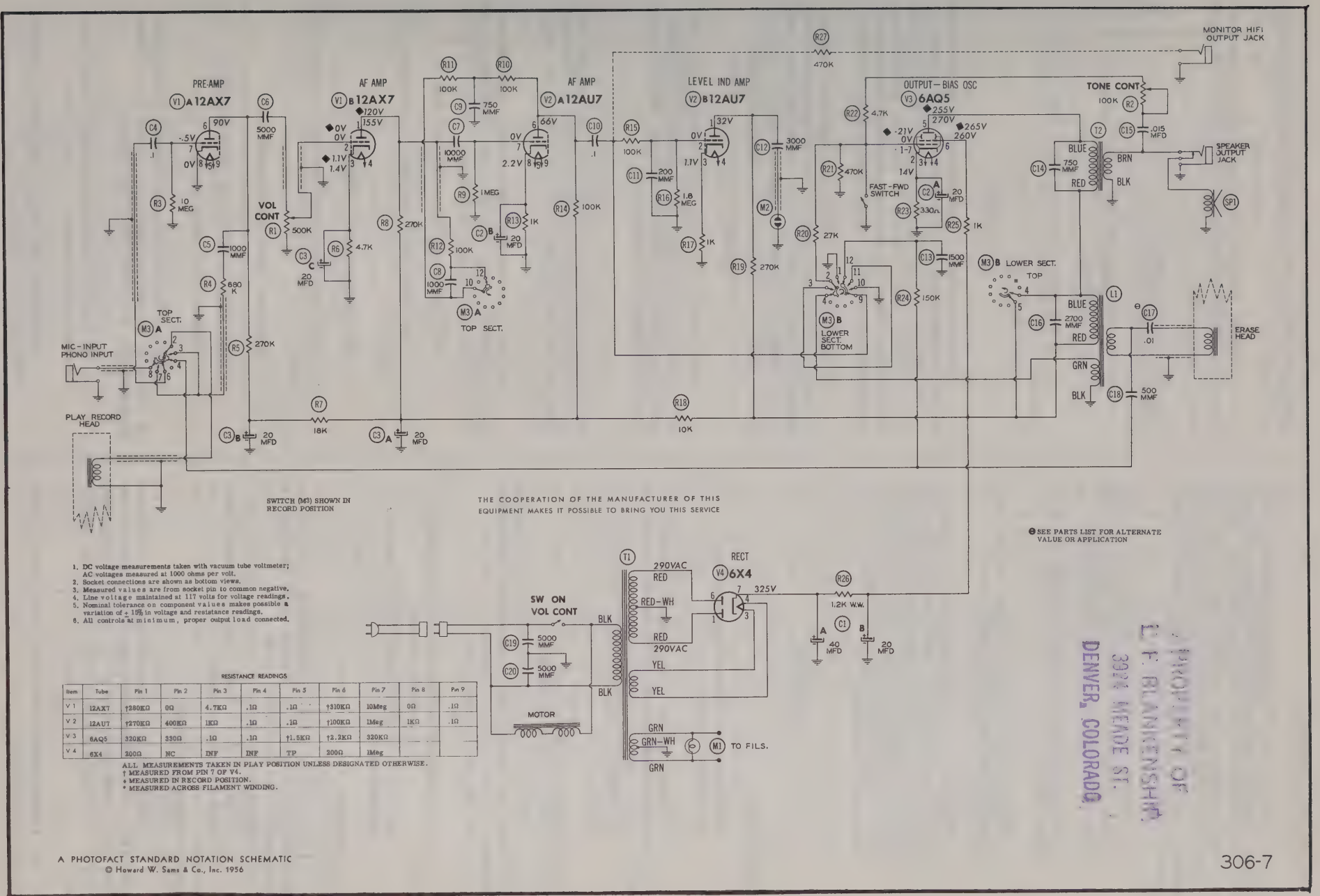


Figure 8



1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	12AX7	†280KΩ	0Ω	4.7KΩ	.1Ω	.1Ω	†310KΩ	10Meg	0Ω	.1Ω
V 2	12AU7	†270KΩ	400KΩ	1KΩ	.1Ω	.1Ω	†100KΩ	1Meg	1KΩ	.1Ω
V 3	6AQ5	320KΩ	330Ω	.1Ω	.1Ω	†1.5KΩ	†2.2KΩ	320KΩ		
V 4	6X4	200Ω	NC	INF	INF	TP	200Ω	1Meg		

ALL MEASUREMENTS TAKEN IN PLAY POSITION UNLESS DESIGNATED OTHERWISE.
† MEASURED FROM PIN 7 OF V4.
♦ MEASURED IN RECORD POSITION.
* MEASURED ACROSS FILAMENT WINDING.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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Schematic Diagram. Models 37-C and 47-A

Pressure Pad Adjustment-

Pressure pads (25) should be adjusted so that they just hold the tape in firm contact with the head. Too much tension can cause speed variation, excessive head, pressure pad and tape wear. Too little tension will cause poor erase, poor recordings and playback, or none at all. If operation indicates misadjustment, check as follows:

1. Place a short length of tape between the pressure pads and head but do not place tape between pressure roller and capstan shaft.

2. Place recorder in "Play" position but leave power "Off".

3. Form a loop in the left end of the tape that is suitable for attaching a spring scale.

4. Alternately, hold pressure pad springs (26 and 27) away from head while pulling tape with spring scale. A pull of approximately 3/4 oz. should be required to move tape. To adjust, bend pressure pad springs (26) and/or (27) in the required direction.

TROUBLES

Fails To Erase-

1. Pressure pad (25) worn or missing.
   (a) Replace pad.

2. Pressure erase spring (26) not adjusted properly, thus, not holding tape in firm contact with erase head.
   (a) Adjust as described under "Pressure Pad Adjustment".

Fails To Record Or Play Back-

1. Tape pressure pad (25) worn or missing, resulting in the tape not being held against the recording head.
   (a) Replace pressure pad.

2. Pressure record spring not adjusted properly.
   (a) Adjust as described under "Pressure Pad Adjustment".

Track Overlap-

Track overlap is when something recorded on one track will be heard in reverse when the tape is turned over to play the other track.
   (a) Mis-alignment of head. Adjust as described under "Play - Record - Erase Head Alignment Adjustment".

Speed Variation Or "Wow"-

1. Check flywheel assembly (67), pressure roller (24), idler wheels (66 and 69), motor drive pulley (54), and drive belt (51) for oil or foreign material. Clean these parts with alcohol or lighter fluid.

2. Check motor pulley (54) to see it it is secured to motor shaft.

3. Check idler roller springs (59) to see if they hold idler rollers in firm contact with motor pulley and flywheel.

4. Check all parts for freedom of movement. Clean any sluggish parts and lubricate as described under "Lubrication".

Tape Overruns Or Spills When Changing Functions-

1. Brake linings (47) worn or missing.
   (a) Replace.

2. Brake springs (35 and 83) broken, loose, or missing.
   (a) Replace.

CLEANING

The record head, capstan shaft, and pressure roller are subject to an accumulation of tape coating oxide, which is worn off the tape as it passes these parts. These parts should be cleaned periodically with a pipe-cleaner or with an absorbent cotton swab on an applicator stick, dampened slightly with water.

If the particles cannot be completely removed in this manner, the applicator may be dampened with alcohol or lighter fluid. Care should be exercised not to permit the solvent to come into contact with the plastic panels on which the controls are mounted.

LUBRICATION

The F-M-E Tape Recorder is equipped with Oilite bearings and should not require lubrication, with the exception of capstan bearing, unless it becomes necessary to replace parts.

Lubricate capstan bearing once a year. Apply a single drop of No. 10 machine oil (sewing-machine type) to the bearing, and run the machine in "Rewind" position for five minutes. With a clean cloth, wipe off all excess oil.

Proper lubricant for the following applications is Plastilube #1 made by The Warren Refining & Chemical Co. of Cleveland, Ohio:

1. Oilite bearings (80), very thin coat.

2. Cam (42) at points of contact with lift levers and brakes.

3. Quick stop spring assembly (35).

4. Brake lever and pressure roller lever bushings.

5. Pressure roller guide washer.

6. Ball bearing pivots for record head.

7. Flywheel ball bearing pivot.

Proper lubricant for the following applications is Dixon's Graphite Lubricant made by J. Dixon Crucible Co. of Jersey City, New Jersey:

1. Cam guide washers at point of contact with pressure roller lever.

2. Cam throw out bracket at point of contact with idler roller levers.

MECHANICAL PARTS LIST

Ref. No.	Part No.	Description
1	330-120	Feed Turntable Assy. (Gray, for Model 37-C)
	355-670	Feed Turntable Assy. (Sand Color, for Model 47-A)
2	330-130	Take-up Turntable Assy. (Gray, for Model 37-C)
	355-130	Take-up Turntable Assy. (Sand Color, for Model 47-A)
3	330-118	Speed Selector Knob(Gray, for Model 37-C)
	355-118	Speed Selector Knob(Sand Color, for Model 47-A)
4	330-46	Main Selector Knob(Gray, for Model 37-C)
	355-46	Main Selector Knob (Brown, for Model 47-A)
5	330-59	Sub-Panel(Gray, for Model 37-C)
	355-59	Sub-Panel(Sand Color, for Model 47-A)
6	330-151	Switch Plate(Gray, for Model 37-C)
	355-151	Switch Plate(Sand Color, for Model 47-A)
7		Screw, 6-32 x 1 1/2 Phillips Head
8		Screw, 6-32 x 1 1/4 Phillips Head
9	330-156	Fast Forward Button (Model 37-C)
9A		Fast Forward Knob (Model 47-A)
10	330-156	Record Lock Button
11	330-54	Fast Forward Plunger (Used only on Model 37-C)
12	330-152	Selector Knob Stop Pin
13	330-149	Stop Bracket
14	330-154	Selector Knob Stop Spring
15		Screw, 6-32 x 1/4 Self Tapping
16	330-58	Tape Guide
17		Hex. Nut
18		Lockwasher
19	330-240	Record and Erase Head Assy.
20		Head Adjustment Screw
21		Head Tension Spring
22		Tape Guide
23		"E" Type Retainer
24	330-50	Pressure Roller
25	330-207	Pressure Pad, Record and Erase Head
26		Pressure Erase Spring
27		Pressure Record Spring
28		Quick Stop Lever
29		Pressure Pad Arm
30		Speednut
31	330-23	Tape Guide, Adjustable
32		Baseplate
33	330-55	Pressure Roller Sub-Assy. Lever
34		Screw
35	355-30	Quick Stop Spring & Rod Assy.
36	330-128	Spacer Washer
37		Pressure Roller Lever Spring
38	330-230	Shorting Switch Assembly
39		Bearing Washer
40		Screw
41	330-180	Cam & Switch Assembly
42	330-69	Spindle Lift Lever
43	330-104	Take-up Brake Lever
44	330-238	Brake Lining, Cork(Take-up Spindle)
45	330-69	Spindle Lift Lever
46	330-234	Fast Forward Return Spring
47		Fast Forward Lever (Model 37-C)
47A		Fast Forward Lever (Model 47-A)
48	330-201	Take-up Brake Lever Spring
49	330-211	Feed Brake Lever
50	355-225	Brake Lining, Cork (Feed Spindle)
	330-227	Brake Lining, Felt (Feed Spindle)
51	330-140	Flywheel Assembly
52	330-144	Ball Bearing, 5/32 Dia.
*53	330-63-F	Drive Disc.
54	330-486	Take-up Drive Belt (Yellow Dot)
*55	330-63-F	Drive Disc.
56	330-485	Rewind Drive Belt (Blue Dot)
57		Rewind Drive Pulley
58	330-218	Small Roller Link
59	330-137	Roller Bracket Spring
60	330-87	Small Roller Assembly
61	330-83	Large Roller Assembly
62	330-136	Large Roller Link
63	330-137	Roller Bracket Spring
64	330-100	Small Roller Bracket Assy.
65	330-95	Large Roller Bracket Assy.
66	330-194	Roller Push-out Bracket
*67	330-114	Speed Nut
*68	330-116-C	Bearing Assembly
69	330-37	Lift Lever Spring
70		Counter Drive Pulley (Used only on Model 47-A)
71	355-668	Counter Drive Belt
72	330-39	Flywheel Support Bracket (Used only on Model 47-A)
73		Screw
74		Brake Spring Connector
75		Speed Change Cam
76		Rubber Tire (Part of Item 77)
77	330-477	Motor Pulley Assembly
78	330-162	Motor
79	330-163	Drive Motor Fan Assembly
80	330-65	Tape Counter Assembly (Used only on Model 47-A)

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ELECTRICAL PARTS LIST

Ref. No.	Part No.	Description
V1		12AX7, Pre-Amp., AF Amp.
V2		12ZU7, AF Amp., Level Ind. Amp.
V3		6AQ5, Audio Output, Bias Osc.
V4		6X4, Rectifier
C1A	330-359	Elect. Cap., 40MFD @ 450V.
C1B		Elect. Cap., 20MFD @ 450V.
C2A	330-358	Elect. Cap., 20MFD @ 25V.
C2B		Elect. Cap., 20MFD @ 25V.
C3A	330-351	Elect. Cap., 20MFD @ 350V.
C3B		Elect. Cap., 20MFD @ 350V.
C3C		Elect. Cap., 20MFD @ 25V.
C4		Cap., Molded Paper, .1MFD @ 400V.
C5		Cap., Ceramic, 1000MMF.
C6		Cap., Ceramic, 5000MMF.
C7		Cap., Ceramic, 10, 000MMF.
C8		Cap., Ceramic, 1000MMF.
C9		Cap., Mica, 750MMF.
C10		Cap., Molded Paper, .1MFD @ 400V.
C11		Cap., Ceramic, 200MMF.
C12		Cap., Ceramic, 3000MMF.

ELECTRICAL PARTS LIST-Con't.

Ref. No.	Part No.	Description
C13		Cap., Ceramic, 1500MMF.
C14		Cap., Mica, 750MMF.
C15		Cap., Paper, .015MFD@600V.
C16		Cap., Mica, 2700MMF.
C17		Cap., Paper, .01MFD.@600V. (Not used in Model 37-C)
C18		Cap., Ceramic, 500MMF.
C19		Cap., Ceramic, 5000MMF.
C20		Cap., Ceramic, 5000MMF.
R1	330-316	Volume Cont. & Switch, 500KΩ
R2	330-315	Tone Cont., 100KΩ
R3		Resistor, 10Meg., 1/2 Watt
R4		Resistor, 680KΩ, 1/2 Watt
R5		Resistor, 270KΩ, 1/2 Watt
R6		Resistor, 4.7KΩ, 1/2 Watt
R7		Resistor, 18KΩ, 1/2 Watt
R8		Resistor, 270KΩ, 1/2 Watt
R9		Resistor, 1Meg., 1/2 Watt
R10		Resistor, 100KΩ, 1/2 Watt
R11		Resistor, 100KΩ, 1/2 Watt
R12		Resistor, 100KΩ, 1/2 Watt
R13		Resistor, 1 KΩ, 1/2 Watt
R14		Resistor, 100KΩ, 1/2 Watt
R15		Resistor, 100KΩ, 1/2 Watt
R18		Resistor, 10KΩ, 1 Watt
R19		Resistor, 270KΩ, 1/2 Watt
R20		Resistor, 27KΩ, 1/2 Watt
R21		Resistor, 470KΩ, 1/2 Watt
R22		Resistor, 4.7KΩ, 1/2 Watt
R23		Resistor, 330Ω, 2 Watt
R24		Resistor, 150KΩ, 1/2 Watt
R25		Resistor, 1KΩ, 2 Watt
R26		Resistor, 1.2KΩ, 5Watt, W.W.
R27		Resistor, 470KΩ, 1/2 Watt(Not used in Model 37-C)
T1	330-161	Power Transformer
T2	330-314	Output Transformer
SP1	330-313	Speaker, 5" x 7" — PM, 4Ω
L1	330-490	Oscillator Coil Assembly
M1		Pilot Lamp (#44)
M2	330-373	Neon Lamp, Record Level Ind. (NE-51)
M3B	330-181-1	Selector Switch, Top Section
M4B	330-181-2	Selector Switch, Bottom Section
M5	330-230	Fast Fwd. Shorting Switch (Item #38 on Exploded View)
R16		Resistor, 1.8Meg., 1/2 Watt
R17		Resistor, 1KΩ, 1/2 Watt

*NOTE: Items marked with an asterisk should not be ordered separately but as an assembly, Part #330-610.

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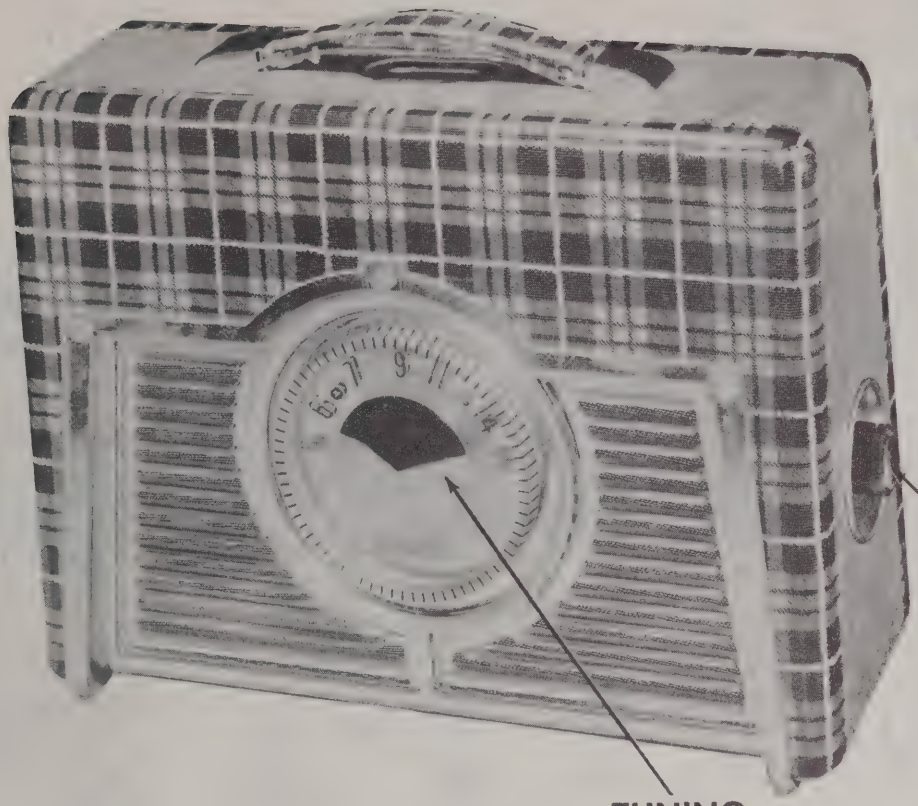
FIRESTONE MODEL
4-C-26 (Code 120-5-P45)



FIRESTONE MODEL
4-C-26 (Code 120-5-P45)

TRADE NAME	Firestone Model 4-C-26 (Code 120-5-P45)
SUPPLIER	Firestone Tire & Rubber Co., 1200 Firestone Pkwy., Akron, Ohio
TYPE SET	Three Power Portable AM Superheterodyne Receiver
TUBES (Five)	Types: 1U4 (or) 1T4 RF Amp., 1R5 Conv., 1U4 (or) 1T4 IF Amp., 1U5 Det.-AVC-AF Amp., 3V4 Output
POWER SUPPLY	105-125 Volts AC/DC (or) 3 Volts "A" Supply & 90 Volts "B" Supply
RATING	.15 Amp. @ 117 Volts AC(or) 145MA @ 3 Volts DC & 9MA @ 90 Volts DC
TUNING RANGE—BROADCAST	538KC-1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Use battery power, if possible. If AC power is used, use an isolation transformer when available. If not, connect a .1MFD capacitor in series with low side of the signal generator and B-.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 6 (grid) of 1R5 (V2). Low side to B-.	455KC (400~Mod)	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum output. If AC power is used without an isolation transformer, reduce dummy antenna to 200MMF to reduce hum modulation.
2.	"	High side to pin 6 (grid) of 1U4 (V1). Low side to B-.	1610KC	"	"	A5	"
3.	"	"	1400KC	Tune to 1400KC signal	"	A6	"
4.	"	"	600KC	Tune to 600KC signal	"	A7	"
5.		Loop	1400KC	Tune to 1400KC signal	"	A8	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed."
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PARTS LIST AND DESCRIPTIONS

FIRESTONE
Model 4-C-26 (Code 120-5-P45)

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: FIRESTONE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	RF Amplifier	1U4	1U4	6AR	1T4 used as an alternate
V2	Converter	1R5	1R5	7AT	
V3	IF Amplifier	1U4	1U4	6AR	1T4 used as an alternate
V4	Det-AVC-AF Amp.	1U5	1U5	6BW	
V5	Audio Output	3V4	3V4	6BX	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING: CAP.	RATING: VOLT.	REPLACEMENT DATA: FIRESTONE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	■50	150	CE-305A				TM-D50-150	T-240	
B	▲50	150					TD-250-15	FM-1530	
C	250	10							
C2	25	50	CE-256-50	PRS50V-25	BR255	TC36	TD-25-50	FM-0525	TVA-1306

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: FIRESTONE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C3	100		CC101	BPD-0001	DD-101	G042	801-101	UC-531	5GA-T1	
C4	.05	200	C503-2	BPD-05	DF-503	CUB2S5		PT415	2TM-S5	
C5	220		CC221	SI220	D6-221	TP39	GP2K-221	UC-5322	5GA-T22	
C6	15000		CC153	BPD-015	DD16-153		821-015			
C7	100		CC101	BPD-0001	DD-101	G042	801-101	UC-531	5GA-T1	
C8	5000		CC502	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C9	100		CC101	BPD-0001	DD-101	G042	801-101	UC-531	5GA-T1	
C10	.047	400	C503-4	BPD-05	DF-503	CUB4S5		PT4147	4TM-S47	
C11	2000		CC202	BPD-002	DD-202	K072	801-002	DC-522	5HK-D2	
C12A	50		♦	♦PA-116-1	♦PC-90	♦114TM1	♦1407-01	UC-545	♦P-2	
B	5000							DC-525		
C	2000							DC-522		
C13	2000		CC202	BPD-002	DD-202	K072	801-002	DC-522	5HK-D2	
C14	.047	400	C1473-4	BPD-05	DF-503	CUB4S47		PT4147	4TM-S47	

♦ Items C12A, C12B, C12C, R15A, R15B and R15C are combined in one unit.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: FIRESTONE PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	750KΩ	½	RV-305	B-70-S	A47-750K-Z			Volume
B	Shaft		Not Req.	Not Req.	FS-3			Attach to R1A
C	Switch		Not Req.	Not Req.	SWE-20			Attach to R1A

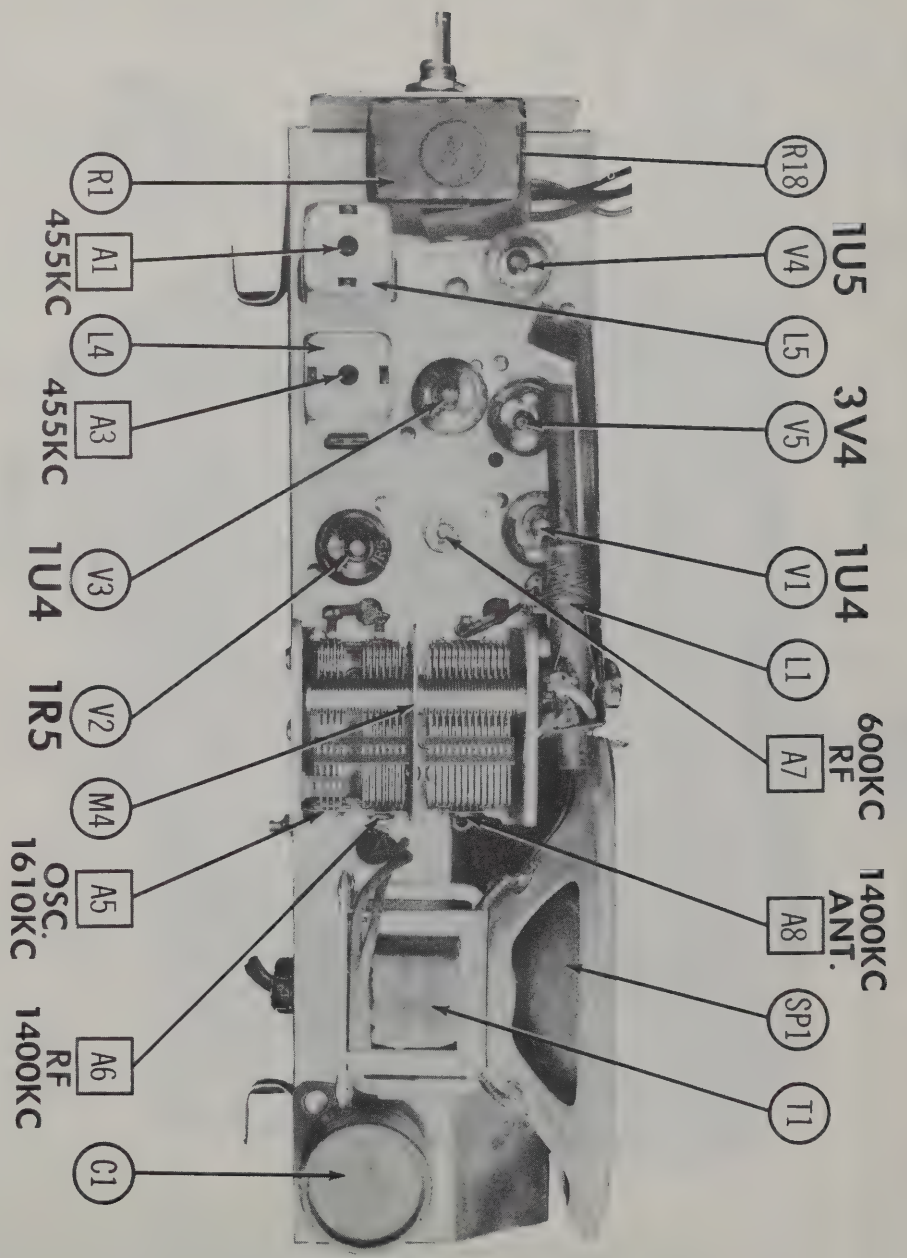
RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: FIRESTONE PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R2	82KΩ	½	R823	BTS-82K	
R3	470KΩ	½		BTS-470K	Note 1
R4	56KΩ	½	R563	BTS-56K	
R5	1.2Meg	½	R125	BTS-1.2Meg	
R6	1000Ω	½	R102	BTS-1000	
R7	2.2Meg	½	R225	BTS-2.2Meg	
R8	150KΩ	½	R154	BTS-150K	
R9	10Meg	½	R106	BTS-10Meg	
R10	10KΩ	½	R103	BTS-10K	
R11	1500Ω	½	R152	BTS-1500	
R12	56KΩ	½	R563	BTS-56K	

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: FIRESTONE PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R13	2.2Meg	½	R225	BTS-2.2Meg	
R14	10Meg	½	R106	BTS-10Meg	
R15A	4.7Meg	½		BTS-4.7Meg	
B	1Meg	½	♦	BTS-1Meg	
C	2.2Meg	½		BTS-2.2Meg	
R16	820Ω	½	R821	BTS-820	
R17	560Ω	½	R561	BTS-560	
R18	220KΩ	½	R224	BTS-220K	
R19	100Ω	2	R101-25		
R20	1500Ω	1	R152-1	BTA-1500	
R21	2000Ω	7	PW7	PW7-2000	Note 2

♦ Items C12A, C12B, C12C, R15A, R15B, R15C are combined in one unit.
Note 1. Not used in all versions.
Note 2. Some versions use a 2050Ω, 7 watt resistor in this application.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	FIRESTONE PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	9.2KΩ	3.3Ω	Part of Spkr.		A-2927 ①	A-3329	24S49	S-11X	① Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	FIRESTONE PART No.	QUAM PART No.	
SP1	5"	PM	3.3Ω	PM-45	5A1 ①	① Use Universal mounting bracket.

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	FIRESTONE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Ant. Coil	.6Ω		L-A51				
L2	RF Coil	13ΩCT		L-306				
L3	Osc. Coil	1.8Ω	14Ω	L-305				
L4	Input IF	15Ω	15Ω	1655-6	16-6758	BC-352	12-C1	
L5	Output IF	15Ω	15Ω	1655-6	16-6758	BC-353	12-C2	
L6	Chassis Isolation	0Ω						7 turns wire wound in series with .1MMF Cap.

SELENIUM RECTIFIER

ITEM No.	RATING	REPLACEMENT DATA						NOTES
	CURRENT	FIRESTONE PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	RADIO RECEPTOR PART No.	SARKES TARZIAN PART No.	
M1	.067ADC	SR1	1003A	RS075	6S75	5M4	75	

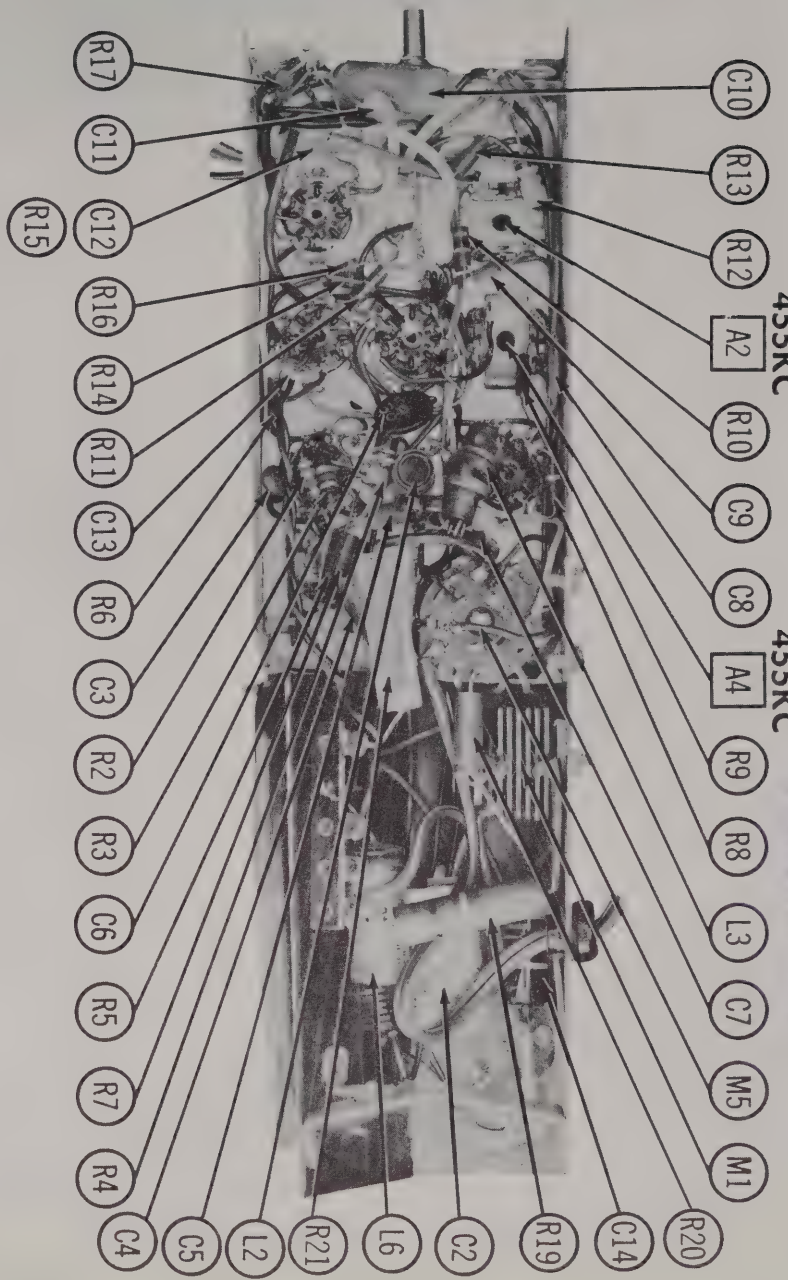
BATTERIES

ITEM No.	VOLTAGE	FIRESTONE PART No.	REPLACEMENT DATA						INSTALLATION NOTES
			EVEREADY			BURGESS			
			"A"	"B"	"A-B"	"A"	"B"	"A-B"	
M2	1.5V "A"	4-D-133	964			2IR			Connect 2 in series
M3	45V "B"	4-D-132		455			XX30		Connect 2 in series

MISCELLANEOUS

ITEM No.	PART NAME	FIRESTONE PART No.	NOTES
M4	Tuning Cap.	CV-305	3 Gang (14-400MMF, 9-205MMF, 10-83MMF)
M5	Switch	SW-305	Power Changeover (SPDT-Rotary-Wafer Type)
	Cabinet	H45-2	
	Knob	H45-5	Tuning
	Knob	H60	On-off-volume

CHASSIS—BOTTOM VIEW



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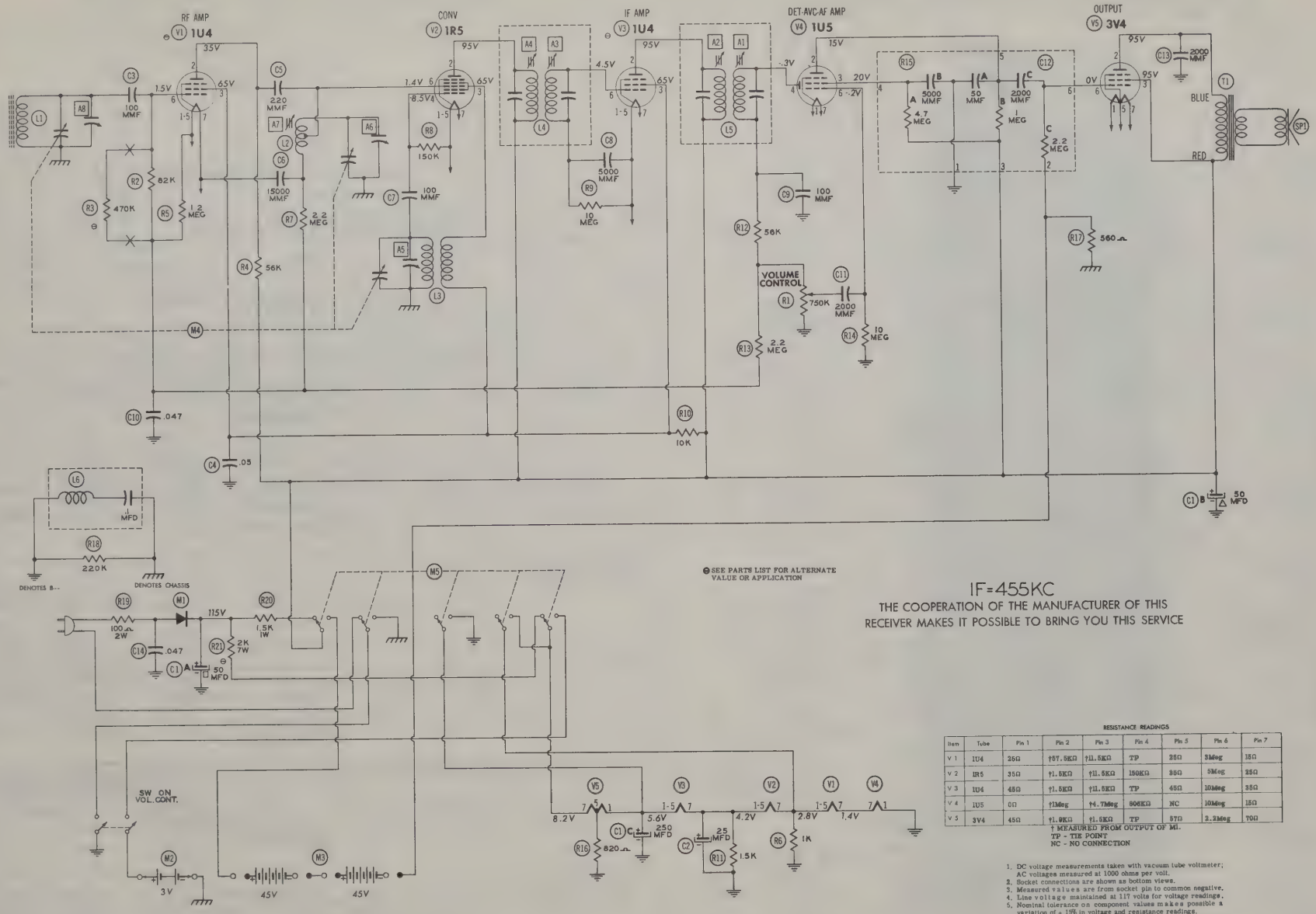
FIRESTONE
Model 4-C-26 (Code 120-5-P45)



IF=455KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	1U4	25Ω	†37.5KΩ	†11.5KΩ	TP	25Ω	3Meg	15Ω
V 2	1R5	35Ω	†1.5KΩ	†11.5KΩ	150KΩ	35Ω	5Meg	25Ω
V 3	1U4	45Ω	†1.5KΩ	†11.5KΩ	TP	45Ω	10Meg	25Ω
V 4	1U5	0Ω	†1Meg	†4.7Meg	806KΩ	NC	10Meg	15Ω
V 5	3V4	45Ω	†1.0KΩ	†1.5KΩ	TP	97Ω	2.2Meg	70Ω

† MEASURED FROM OUTPUT OF M1.
TP - TIE POINT
NC - NO CONNECTION

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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PHOTOFACT* Folder

*TRADE MARK

HALLICRAFTERS MODELS 21K330BA, MA, 21K340BA, MA, 21T420B, M, 21T421B, M, 24T430B, M, 24T431B, M (Ch. A1850D, B1850D, C1850D, D1850D)

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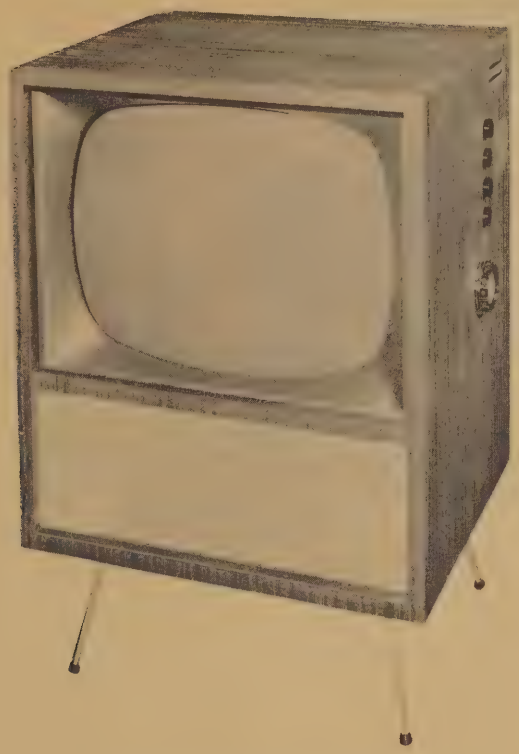

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HALLICRAFTERS MODEL 21K340MA

TRADE NAME	Hallicrafters	MODELS	CHASSIS
		21K330BA, 21K330MA, 21K340BA, 21K340MA, 21T420B, 21T420M	A1850D
		21T421B, 21T421M	B1850D
		24T430B, 24T430M	C1850D
		24T431B, 24T431M	D1850D
MANUFACTURER	Hallicrafters Co., 4401 W. 5th. Ave., Chicago 24, Illinois		
TYPE SET	Television Receiver		
TUBES	Fifteen		
POWER SUPPLY	110-120 Volts AC-60 Cycles	RATING 1.2 Amp. @ 117 Volts AC	
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)		

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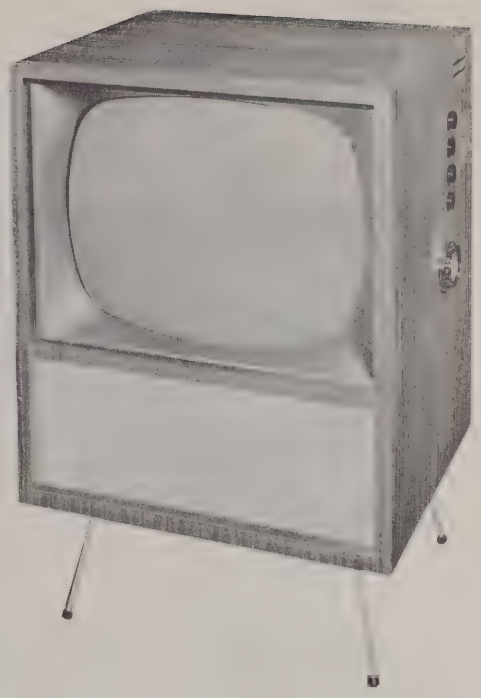
RETMA MEMBER

HALLICRAFTERS MODELS 21K330BA, MA, 21K340BA, MA, 21T420B, M, 21T421B, M, 24T430B, M, 24T431B, M (Ch. A1850D, B1850D, C1850D, D1850D)



DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 6 push-on type control knobs from side panel of cabinet.
2. Remove 6 wood screws. Remove rear cover.
3. Disconnect speaker leads.
4. Remove 1 wood screw. Remove antenna terminal bracket.
5. Remove 2 wood screws holding top chassis support.
6. Remove 4 mounting board bolts. Remove chassis with mounting board.
7. Remove 2 wing nuts. Remove speaker.

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MODELS	CHASSIS
21K330BA, 21K330MA, 21K340BA, 21K340MA, 21T420B, 21T420M	A1850D
21T421B, 21T421M	B1850D
24T430B, 24T430M	C1850D
24T431B, 24T431M	D1850D

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF tuner oscillator circuit may be accomplished by removing the channel selector and fine tuning knobs.

PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass, remove 5 wood screws holding plastic strip at the top edge of the safety glass. Remove plastic strip and safety glass. Use extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION

See cabinet rear view on page 16.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

For adjustment of the horizontal oscillator it is necessary to remove the rear cover and supply power to the set. Adjustment is located on top of chassis. Set the horizontal hold control at the center of its range and adjust the horizontal frequency slug (B1) until picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

Adjust the buzz control (R8) located on top of chassis for maximum volume and minimum buzz.

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly centered.

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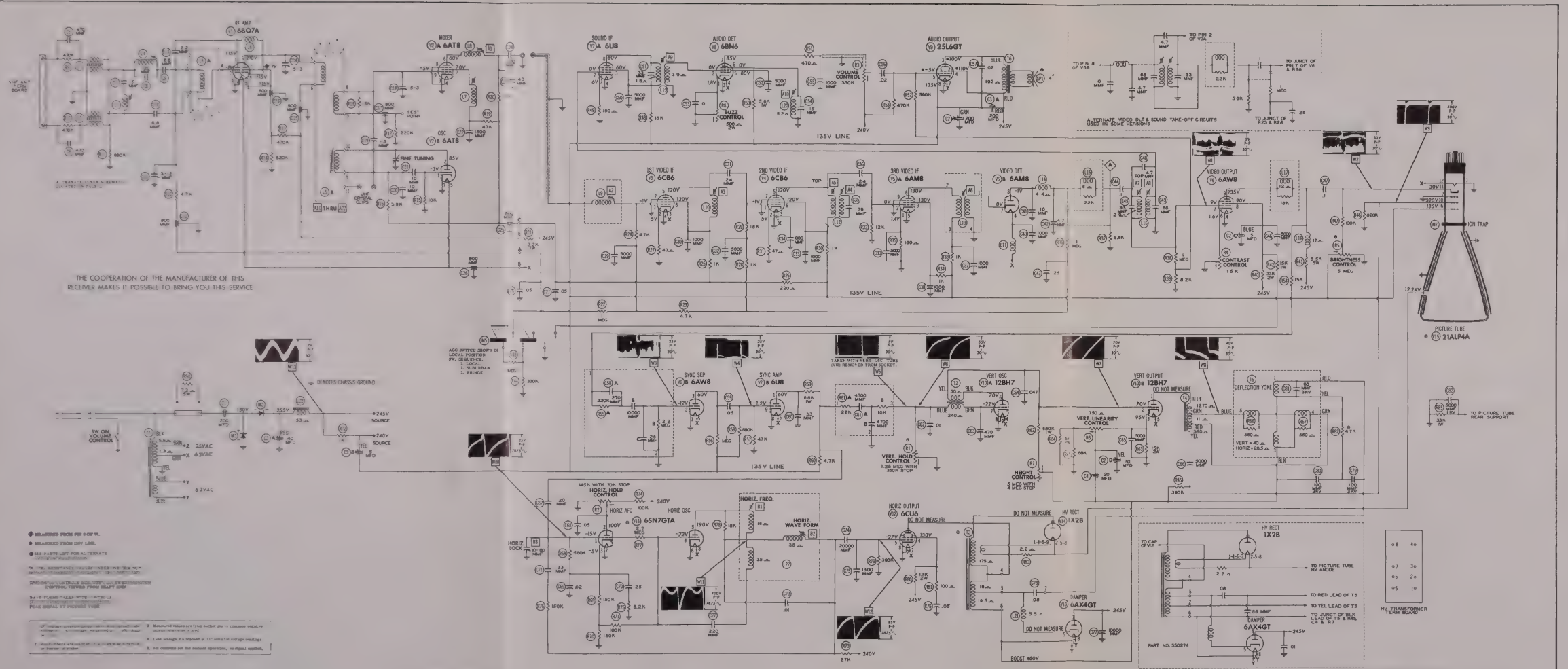

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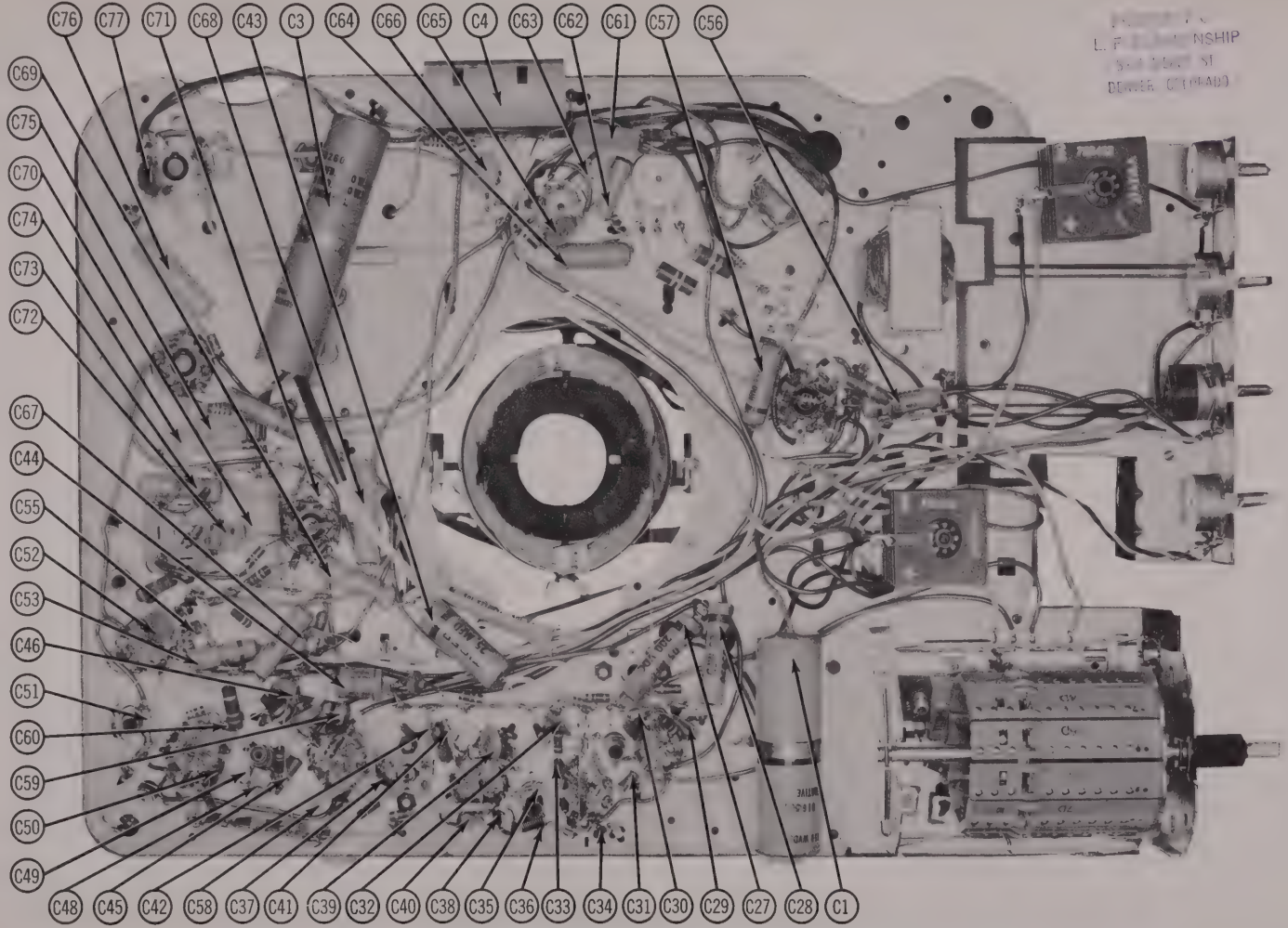
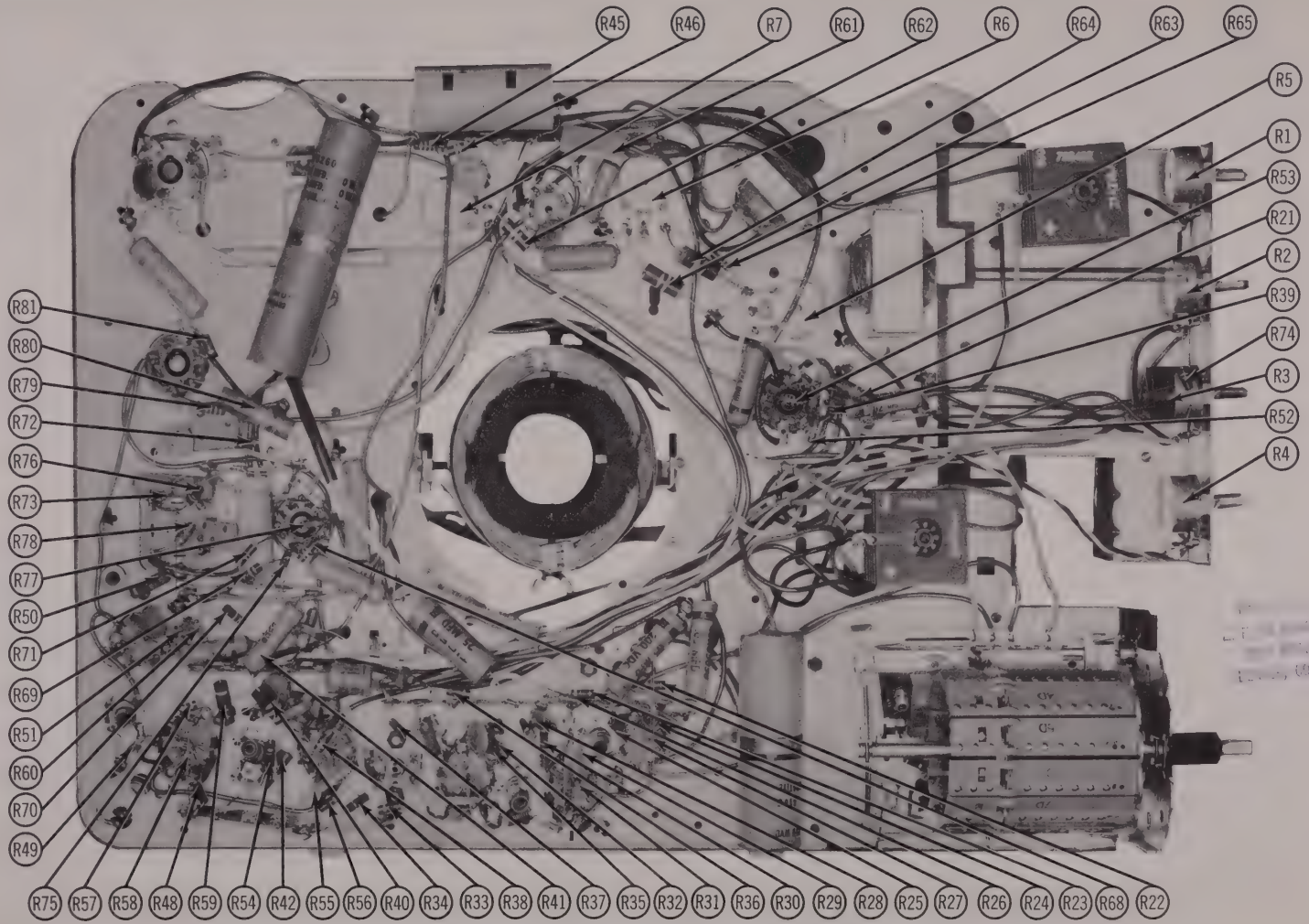


CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

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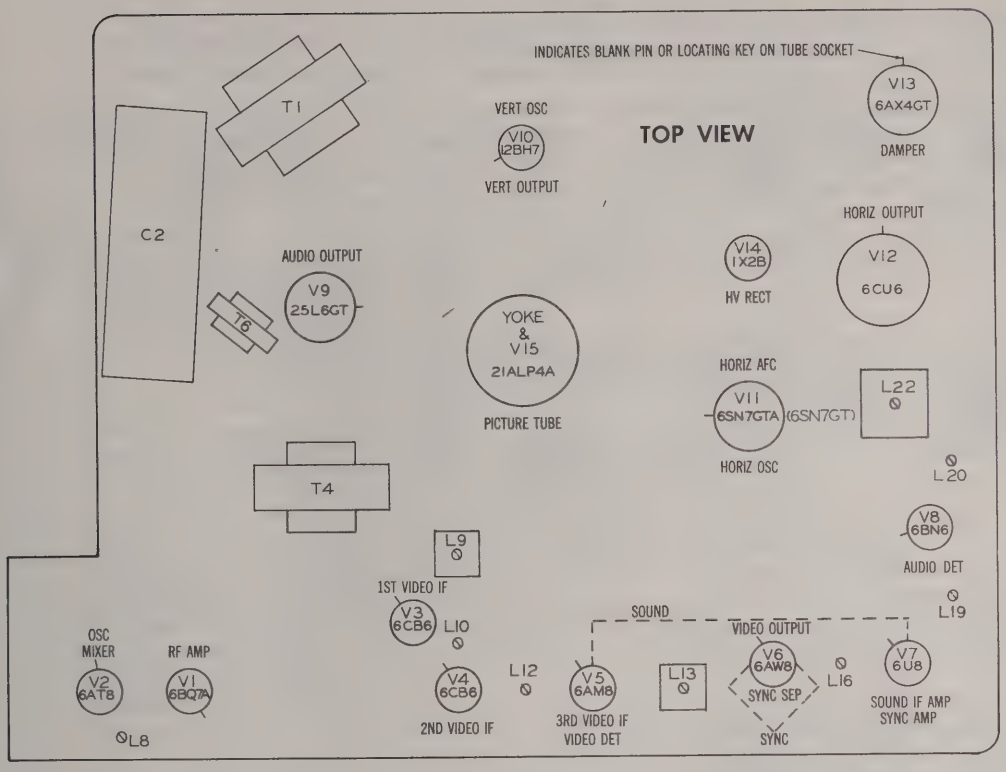
TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - **Selenium Rectifiers (M1 & M2)**

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - **V2, V3, V4, V5, V9**
No pic, no sound, has snow - **V1, V2, V3**
No pic, has sound, has raster - **V6, V15**
Has pic, no sound - **V7, V8, V9**

SYNC FAILURE
No vert. sync - **V7, V10**
No horiz. sync - **V7, V11**
No vert. or horiz. sync - **V6, V7**

SWEEP FAILURE
No raster, has sound - **V11, V12, V13, V14, V15**
No vertical deflection - **V10**
Poor vert. linearity or foldover - **V10**
Poor horiz. linearity or foldover - **V11, V12, V13**
Narrow picture - **V11, V12, V13, V14, M1, M2**
Vert. off freq. - **V7, V10**
Horiz. off freq. - **V7, V11**

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use an isolation transformer to protect the test equipment.
The high voltage shock hazard may be eliminated by removing the 6AX4 (V13) from its socket and connecting a 2250/30 watt resistor from pin 3 to pin 5 of the tube socket.

VIDEO IF ALIGNMENT

Connect the negative lead of a 3 volt battery to the ungrounded side of C43. Connect the positive lead to chassis. Two peaks may occur during alignment of the video IF coils. Use the peak with the slug entering the coil from the end nearest the chassis. The sound trap (A4) should be tuned to the peak with the slug entering the coil from the end away from the chassis.
Set the channel selector switch b etween any two channels. This will disable the local oscillator and reduce the possibility of erroneous indications.
Attenuate sweep generator output for 2 volts peak to peak on scope.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Direct	High side to an ungrounded tube shield (coating over converter tube (V3). Low side to chassis.	44MC (10MC Swp.)	41.25MC 45.75MC	Between any two channels	Vert. Amp. thru detector (Fig. 1) to pin 5 (plate) of 6CB6 (V3). Low side to chassis.	A1, A2	Adjust for response similar to Fig. 2.
2.	"	"	"	"	"	Vert. Amp. thru 3.3KΩ to point Ⓐ. Low side to chassis.	A3, A4, A5, A6	Adjust for response similar to Fig. 3. Adjust A4 for MINIMUM marker amplitude at 41.25MC. A3 affects the high frequency end of response and A5 the low frequency end. A6 affects center of response.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
3.	.001MFD	High side to point Ⓐ. Low side to chassis.	Not used	4.5MC (400∿mod.)	Any non-interfering channel	Vert. Amp. thru detector (Fig. 4) to pin 1 (cathode) of picture tube. Low side to chassis.	A7	Set volume control to its mid-range position. Set contrast control fully clockwise. Preset A7 and A8 so that slugs are out of coil winding in a direction away from chassis. Adjust A7 for MINIMUM 400∿ indication on scope.
4.	"	"	4.5MC (15KC Swp.)	4.5MC	"	Vert. Amp. across voice coil.	A10	Turn buzz control (R8)90 degrees from its maximum clockwise position. Attenuate generator output to give MINIMUM useful indication on scope. Adjust A10 for maximum response at 4.5MC. Adjust volume control as necessary to maintain pattern size on scope.
5.	"	"	"	"	"	"	A8, A9	Attenuate generator output to maintain a signal level below the limiting action of the 6BN6. Adjust A8 and A9 for maximum response at 4.5MC.
6.	"	"	Not used	4.5MC (400∿ Mod.)	"	"	R8	Adjust buzz control (R8) for MINIMUM 400∿ indication on scope.
7.	"	"	4.5MC (15KC Swp.)	4.5MC	"	"	A10	Set generator to give a strong signal and adjust A10 for maximum response at 4.5MC. Attenuate generator output for signal input below limiting level of 6BN6 and repeat step 5.

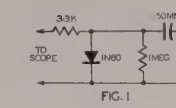


FIG. 1

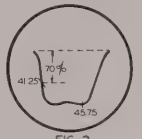


FIG. 2

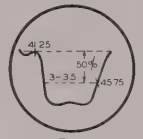


FIG. 3

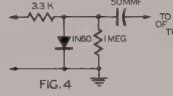


FIG. 4

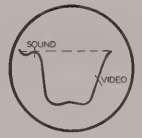


FIG. 5

SOUND IF ALIGNMENT USING A TV SIGNAL

Remove the 2250Ω resistor from pin 3 to pin 5 of V13 and replace the 6AX4 in its socket.
Tune the receiver to a TV station and connect an attenuator between the receiver and antenna so that the signal input to the receiver can be varied from weak to strong. If a suitable attenuator is not available stray feed the signal into the receiver by placing the antenna near the antenna terminals.
Set the tube control (R8) to its approximate mid-range position.
Adjust A7, A8 and A9 for maximum program sound. If peaks appear at two different settings use the one farthest counter-clockwise position.
Reduce signal input to lowest useable level and check settings of A7, A8 and A9. Apply a strong signal and adjust A10 for maximum program sound.
Apply a very weak signal and adjust R8 for minimum noise.

OSCILLATOR ALIGNMENT

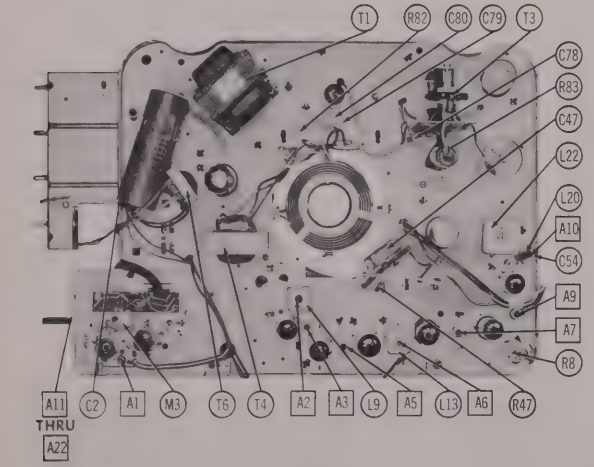
Remove the 2250Ω resistor from V13 tube socket (Pin 3 and 5) and replace the 6AX4 in its socket.
Leave the bias connected as under "Video IF Alignment".
The channel oscillator screws are reached through a hole just to the right of the channel switch shaft. The correct adjustment screw is accessible through this hole as the channel switch is turned to each channel.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
8.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC (10MC Swp.)	211.25MC 215.75MC	13	Vert. Amp. thru 3.3KΩ to point Ⓐ. Low side to chassis.	All	Adjust to place sound marker in trap notch as in Fig. 5. Video marker should be at 50%.
			207MC (10MC Swp.)	205.25MC 209.75MC	12		A15	
			201MC (10MC Swp.)	199.25MC 203.75MC	11		A15	
			195MC (10MC Swp.)	193.25MC 197.75MC	10		A14	
			189MC (10MC Swp.)	187.25MC 191.75MC	9		A15	
			183MC (10MC Swp.)	181.25MC 185.75MC	8		A16	
			177MC (10MC Swp.)	175.25MC 179.75MC	7		A17	
			85MC (10MC Swp.)	83.25MC 87.75MC	6		A18	
			79MC (10MC Swp.)	77.25MC 81.75MC	5		A19	
			93MC (10MC Swp.)	91.25MC 95.75MC	4		A20	
			83MC (10MC Swp.)	81.25MC 85.75MC	3		A21	
			57MC (10MC Swp.)	55.25MC 59.75MC	2		A22	

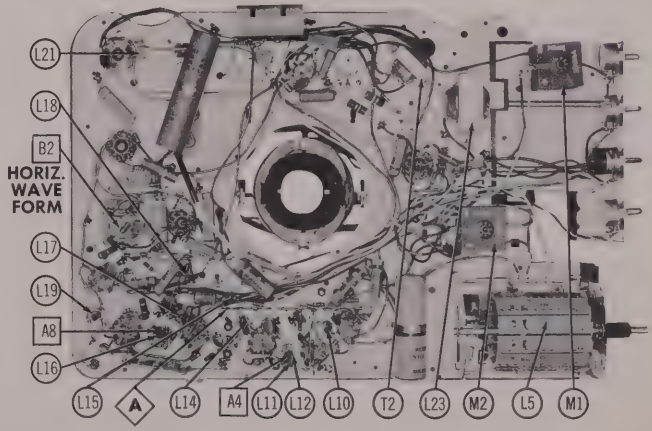
RF AND MIXER ALIGNMENT

The RF and Mixer portion of this receiver has been properly aligned at the factory and is very stable. Alignment of this portion of the receiver should not be required in the field.

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO



CHASSIS TOP VIEW



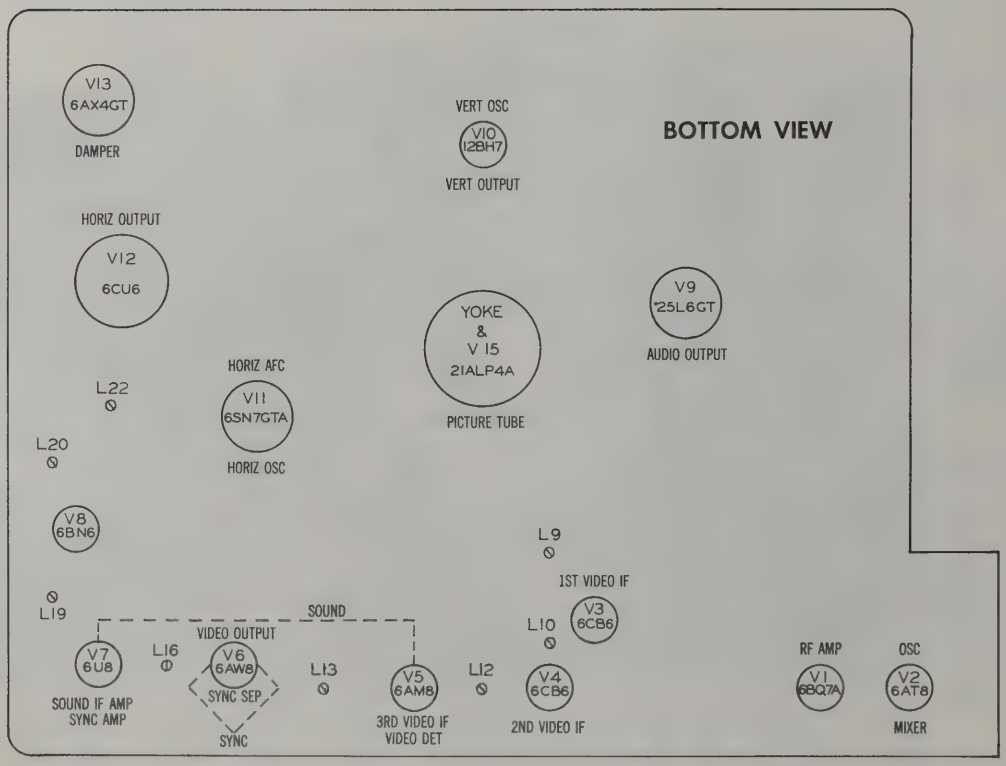
CHASSIS BOTTOM VIEW-TRANS., INDUCTOR & ALIGN. IDENTIFICATION

HALLICRAFTERS MODELS 21K330BA, MA, 21K340BA, MA, 21T420B, M, 21T421B, M, 24T430B, M, 24T431B, M (Ch. A1850D, B1850D, C1850D, D1850D)

RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BQ7A	INF	2Meg	0Ω	0Ω	. 1Ω	†2. 2KΩ	300KΩ	INF	300KΩ
V 2	6AT8	10KΩ	■4. 1KΩ	0Ω	0Ω	. 1Ω	■15KΩ	■47KΩ	0Ω	220KΩ
V 3	6CB6	1Meg	47Ω	. 1Ω	0Ω	■1. 2KΩ	■1. 2KΩ	0Ω		
V 4	6CB6	1Meg	47Ω	. 1Ω	0Ω	■1KΩ	■1KΩ	0Ω		
V 5	6AM8	180Ω	12KΩ	■1KΩ	. 1Ω	0Ω	■1KΩ	. 2Ω	5. 6KΩ	0Ω
V 6	6AW8	0Ω	2. 2Meg	■1Meg	0Ω	. 1Ω	75Ω	1Meg	†33KΩ	†5. 5KΩ
V 7	6U8	■12KΩ	. 9Ω	■18KΩ	0Ω	. 1Ω	■18KΩ	150Ω	0Ω	47KΩ
V 8	6BN6	200Ω	3. 9Ω	0Ω	. 1Ω	■5. 6KΩ	5. 2Ω	†300KΩ		
V 9	25L6GT	TP	0Ω	†245Ω	†53Ω	300KΩ	TP	1. 3Ω	150KΩ	
V 10	12BH7	▲1. 3KΩ	▲2. 5Meg	7KΩ	. 1Ω	. 1Ω	▲2. 5Meg	550KΩ	0Ω	0Ω
V 11	6SN7GTA	750KΩ	†100KΩ	300KΩ	250KΩ	†28KΩ	0Ω	0Ω	. 1Ω	
V 12	6CU6	TP	0Ω	NC	†12KΩ	390KΩ	NC	. 1Ω	0Ω	TOP CAP ▲24Ω
V 13	6AX4GT	NC	TP	100KΩ	NC	†53Ω	TP	100KΩ	100KΩ	
V 14	1X2B		PINS	1-8	HAVE	INF	RESISTANCE			TOP CAP ▲200Ω
V 15	21ALP4A	0Ω	0Ω	PIN 6 150KΩ	PIN 10 ▲350KΩ	PIN 11 ■400KΩ	PIN 12 . 1Ω			

†MEASURED FROM OUTPUT OF M2.
■MEASURED FROM 135V LINE.
▲MEASURED FROM PIN 3 OF V13.
NC-NO CONNECTION.
TP-TIE POINT.



TUBE PLACEMENT CHART

PROPERTY OF
D. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

HALLICRAFTERS MODELS 21K330BA, MA, 21K340BA, MA, 21T420B, M, 21T421B, M, 24T430B, M, 24T431B, M (Ch. A1850D, B1850D, C1850D, D1850D)

ALTERNATE UHF-VHF TUNER SCHEMATIC

MIXER A 6U8
RF AMP 6BZ7
OSC B 6U8
UHF OSC 6AF4
TEST POINT
FINE TUNING
CHANNEL SELECTOR SWITCH SHOWN IN CHANNEL 13 POSITION
UHF-VHF TUNER PART NO. ID2283 USED WITH CHASSIS B1850D, AND D1850D
UHF POWER PLUG & SOCKET
VHF ANT. TERM. BOARD
UHF ANT. TERM. BOARD
(IF OUTPUT) TO L9
(RF AGC) TO JUNCT. O C28 & R22
210V
130V
A PHOTOFACT STANDARD NOTATION SCHEMATIC
© Howard W. Sams & Co., Inc. 1956

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No	USE	REPLACEMENT DATA			RETMA BASE TYPE	NOTES
		Hallicrafters PART No.	STANDARD REPLACEMENT			
V1	RF Amp.	5BQ7A	5BQ7A		BAJ	
V2	Mixer-Osc.	6AT8	6AT8		NDW	
V3	1st Video IF Amp.	6CB6	6CB6		TCM	
V4	2nd Video IF Amp.	6CB6	6CB6		TCM	
V5	3rd Video IF Amp.					
	Video Det.	6AM8	6AM8		9CY	
V6	Video Output-Sync Sep.	6AW8	6AW8		9DX	
V7	Sound IF Amp. - Sync Amp.	6U8	6U8		9AE	
V8	Audio Det.	6BN6	6BN6		7DF	
V9	Audio Output	25L6GT	25L6GT		7AC	
V10	Vert Osc. - Vert. Output	12BH7	12BH7		9A	
V11	Horiz. AFC - Horiz. Osc.	6SN7GTA	6SN7GTA		8BD	6SN7GT used as an alternate.
V12	Horiz Output	6CU6	6CU6		6AM	
V13	Damper	6AX4GT	6AX4GT		4CG	
V14	HV. Rect.	1X2B	1X2B		9Y	

CATHODE-RAY TUBE

ITEM No	REPLACEMENT DATA					RETMA BASE TYPE	NOTES
	Hallicrafters PART No.	CBS GENERAL ELECTRIC PART No.		SYLVANIA PART No.	WESTINGHOUSE PART No.		
V15	21ALP4A ①	21ALP4A ①	21ALP4A ①	21ALP4A ②	21ALP4A ①	LXL	① Aluminized
		21ALP4		21ALP4	21ALP4	LXL	② Silver Screen
	24DP4A ⊥	24DP4A ⊤	24DP4A ⊤	24DP4A ①	24DP4A ①	LXL	
				24DP4	24DP4	LXL	

ELECTROLYTIC CAPACITORS

ITEM No	RATING		REPLACEMENT DATA					
	CAP	VOLT	Hallicrafters PART No.	AEROVOX PART No.	CORNELL DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1	200	150	45B265	PRS150V-200	BRHD10015	WB-348	TD-200-300	S-150	
C2A	140	300	45B263			WQ-505	CDB-1008	Q-182	
B	200	150							
C	5	350							
D	30	150							
C3A	300	150	45B260			WD845	TDL-306	D-068	
B	5	350							
C4	20	450	45B308	PRS450V-20	BR2045	TC75	TD-20-450	FM-4502	TVA-1709

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	Hallicrafters PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C5	470	500	47X20B471M	S1470	D6-471	5W5T47	GP2K-471	UC-5347	1FM-347	
C6	470	500	47X20B471M	S1470	D6-471	5W5T47	GP2K-471	UC-5347	1FM-347	
C7	55			MP0-D25	TCZ-4R7	Z01J	MP0L-430	ZT-556	5TCCB-V47	
C8	120			MP0-D1Z0	TCZ-120	TZ3J	MP0-4R3		5TCC-T12	
C9	6.8			MP0-D15.8	TCZ-6R8	Z01J	MP0A-6R8	ZT-5568	5TCCB-V68	
C10	6.8			MP0-D15.8	TCZ-6R8	Z01J	MP0A-6R8	ZT-5568	5TCCB-V68	
C11	3-15									
C13	800									
C13	2.2			NP0-SI2.2	TCZ-2R2	Z006	MP0A-2R2		5TCCB-V22	
C14	.5-3				820-3		3135-01-0H5	CT565A		
C15	800									
C16	800									
C17	.8-3				S39-3		3135-01-0H5	CT565A		
C18	1.5			NP0-SI1.5	TCZ-1R5	TZ04	MP0A-1R5	ZT-5515	5TCCB-V15	
C20	10			MP0-D10	TCZ-10	Z01H	MP0K-100	ZT-541	5TCC-Q1	
C21	10			MP0-D10	TCZ-10	Z01H	MP0K-100	ZT-541	5TCC-Q1	
C22	1500			BP0-D1015	BD-152	K07U	801-0015	DC-5215	5HK-D15	
C23	43				TCZ-43	Z03J	MP0L-430		5TCC-T43	
C24	1000			BP0-D01	DD-102	K09U	801-001	DC-521	5HK-D1	
C25	800									
C26	800									
C27	.05	200		46AU503J	BPD-05	DF-503	CUB2S5	PT415	2TM-S5	
C28	.05	200		46AU503J	BPD-05	DF-503	CUB2S5	PT415	2TM-S5	
C29	5000			47A168	BPD-005	DD-502	K080	81J-005	DC-525	5HK-D5
C30	10			47A230	BPD-001	DD-102	K09U	801-001	DC-521	5HK-D1
C31	24			47CA20A240J	NP0-S125	TCZ-24	TZ15	NP0L-240		5TCC-Q25
C32	5000			47A168	BPD-005	DD-502	K080	81J-005	DC-525	5HK-D5
C33	1000			47A230	BPD-001	DD-102	K09U	801-001	DC-521	5HK-D1
C34	1000			47A230	BPD-001	DD-102	K09U	801-001	DC-521	5HK-D1
C35	39				NP0-S139	TCZ-39	NP0L-390			5TCC-Q39
C36	24			47CA20A240J	NP0-S125	TCZ-24	TZ15	NP0L-240		5TCC-Q25
C37	1000			47A230	BPD-001	DD-102	K09U	801-001	DC-521	5HK-D1
C38	1000			47A230	BPD-001	DD-102	K09U	801-001	DC-521	5HK-D1
C39	5000			47A168	BPD-005	DD-502	K080	81J-005	DC-525	5HK-D5
C40	1000			47A230	BPD-001	DD-102	K09U	801-001	DC-521	5HK-D1
C41	10			47CA10100F	GL10	D6-100	TP09	GP1K-100	UC-541	5GA-Q1
C42	4.7			47A180-S	NP0-SI4.7	TCZ-4R7	TZ07	NP0A-4R7	ZT-5547	5TCCB-V47
C43	.34	100		46A342	P388-.34		CUB2P25		PT402S	2TM-P25
C44	.1	150		46A343	P388-.1	BP-104	CUB2P1		PT401	2TM-P1
C45	33			47A478						
C46	5000			47A168	BPD-005	DD-502	K080	81J-005	DC-525	5HK-D5
C47	.1	400		46AV104J	P488N-1	BP-104	CUB4P1		PT401	4TM-P1
C48	4.7			47A180-S	NP0-SI4.7	TCZ-4R7	TZ07	NP0A-4R7	ZT-5547	5TCCB-V47
C49	68			47B479						
C50	5000			47A168	BPD-005	DD-502	K080	81J-005	DC-525	5HK-D5
C51	33			47A478						
C52	5000			47A168	BPD-005	DD-502	K080	81J-005	DC-525	5HK-D5
C53	.01	300		46AU503J	BP-01	D6-103	CUB4S1	GP3-333-103	PT401	4TM-S1
C54	15			47A480						
C55	1000			47A230	BPD-001	DD-102	K09U	801-001	DC-521	5HK-D1
C56	.01	300		46AU503J	BP-01	DF-503	CUB2S1	81T-02	PT415	2TM-S2
C57	.02	300		46AZ303J	BPD-02	DF-203	CUB2S2	81T-02	PT512	6TM-S2
C58A	170				SI70		TP41	GP2K-171	UC-5327	5GA-T27
B	10000			⊤48A046	BPD-01	⊤PC-253	K082	81J-01	DC-511	5HK-S1
C	25				SI25		TP25	GP1K-250	UC-5426	5GA-Q25
C59	.05	300		46AU503J	BPD-05	DF-505	CUB2S5		PT415	2TM-S5
C60	33			47CA20A330M	SI33	D6-330	TP27	GP1K-330	UC-5433	5GA-Q33
C61A	4700			⊤48A044	BPD-0047	⊤PC-106	K079	81J-0047	DC-535	5HK-D47
B	4700				BPD-0047		K079	81J-0047	DC-525	5HK-D47
C62	.01	400		46BH103Z4	BPD-01	D6-103	CUB4S1	GP3-333-103	PT411	4TM-S1
C63	470			47CA2047K	SI470	D6-471	TP46	GP2K-471	DC-5347	5GA-T47
C64	.047	400		46ZR473Z4	BPD-05	DF-503	CUB4S47		PT415	4TM-S47

PARTS LIST AND DESCRIPTIONS

CAPACITORS (cont)

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	Hallicrafters PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C65	5000		47A168	BPD-005	DD-502	K080	81J-005	DC-525	5HK-D5	
C66	5000		47A168	BPD-005	DD-502	K080	81J-005	DC-525	5HK-D5	
C67	20		47CA20200K	SI20	D6-200	G01S	GP1K-200	UC-542	5GA-Q2	
C68	.05	400	46AW503J	BPD-05	DF-503	CUB4S5		PT415	4TM-S5	
C69	.02	300	46AU203J	BPD-02	DF-203	CUB2S2	81T-02	PT415	2TM-S2	
C70	.05	100	46A343	P388N-.05		CUB3P25		PT403S	3TM-P25	
C71	33		47A478							
C72	130	500	47X20B221K	1469-50023	D6-221	SR5T22	81J-221	MC3240	MS-522	
C73	.01	400	46C344	BPD-01	D6-103	CUB4S1	GP3-333-103	PT411	4TM-S1	
C74	20000		47A242	BPD-02	DF-203	K068	81T-02	PT615	6HK-S2	
C75	1300	500	47X30B132K	1464-00013		1R5D13			MS-213	
C76	.05	400	46AW503J	BPD-05	DF-503	CUB4S5		PT415	4TM-S5	
C77	10000		47A234	BPD-01	DD-103	K082	81J-01	DC-511	5HK-S1	
C78	.01	300	46AU803F							
C79	100	3000	47A570	HVD-30-0001	DD30-101	V3T1	3KV-101	DC3031	30GA-T1	
C80	100	3000	47A570	HVD-30-0001	DD30-101	V3T1	3KV-101	DC3031	30GA-T1	
C81	68	3000		HVD-30-68	DD30-680	V3Q68	3KV-680	DC30468	30GA-Q68	
C82	5000	1000	47A485	HVD-15-005	DD-502	V2D5	1R5KV-472		10HK-D47	

† Items C58A, C58B, C58C, R55A and R55B are combined in one unit.
• Items C61A, C61B, R61A and R61B are combined in one unit.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESIST ANCE	WATTS	Hallicrafters PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	1.25Meg	½	25B1097	B-69•	A47-1Meg-B•	Q11-138•	TA16L •	Vertical Hold, 360KΩ Fixed Minimum
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R1A.
R1A	1.25Meg	½	25B1178					Vertical Hold, See Note 1
R2A	145KΩ	½	25B1050	B-35†	A47-75K-0†	Q11-128†	U-43†	Horizontal Hold, Stop at 70KΩ
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R2A.
R3A	350KΩ	½	25B1021	B-60-S	A47-500K-Z	Q11-132	TA334A	Volume
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R3A.
C	Switch		Not Req.	Not Req.	SWS-13	T5-1	US-35	Attach to R3A.
R4A	150KΩ	½	25B1052	AB-S35		Q17-109	U-5	Contrast
B	Shaft		Not Req.	AK-3		Not Req.	Not Req.	Attach to R4A.
R5A	5Meg	½	25B1096			Q11-141	TAP46R	Brightness
B	Shaft		Not Req.			TQ	Not Req.	Attach to R5A.
R5	5Meg	½	26A1096					Brightness-See Note 1
R6A	750Ω	½	25B1099	AB-5	A47-750-S	Q11-105	TAP75L	Vertical Linearity
B	Shaft		Not Req.	AK-19	RN-3	TQ	Not Req.	Attach to R6A.
R7A	5Meg	½	25B1098	AB-5SP	A47-5Meg-S•	Q11-141•	TAP35L•	Height Stop at 4Meg
B	Shaft		Not Req.	AK-19	RN-3	TQ	Not Req.	Attach to R7A.
R8	5000	2	25A1095		39-500			Buzz (Wire Wound)

• Connect a 330KΩ resistor in series with the left hand terminal of the control and the lead connecting to the same terminal of the original control (control viewed from shaft end, terminals down).
† Connect a 68KΩ resistor in series with the right hand terminal of the control and the lead connecting to the same terminal of the original control (control viewed from shaft end, terminals down).
• Connect a 1Meg resistor in series with the right hand terminal of the control and the lead connecting to the same terminal of the original control (control viewed from shaft end, terminals down).
Note 1. Used as an alternate in some versions.

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	Hallicrafters PART No.	IRC PART No.	
R9	470KΩ	½	23X20X474K	BTS-470K	
R10	470KΩ	½	23X20X474K	BTS-470K	
R11	680KΩ	½	23X20X684K		
R12	470Ω	½	23X20X472K	BTS-470Ω	
R13	470KΩ	½	23X20X474K	BTS-470K	
R14	330KΩ	½	23X20X334K	BTS-330K	
R15	10KΩ	½		BTS-10K	
R16	3900Ω	½		BTS-3900	
R17	220KΩ	½		BTS-220K	
R18	15KΩ	½		BTS-15K	
R19	47KΩ	½	23X20X473K	BTS-47K	
R20	15KΩ	½		BTS-15K	
R21	2200Ω	½	23X20X222K	BTA-2200	
R22	1Meg	½	23X20X105K	BTS-1Meg	
R23	470Ω	½	23X20X472K	BTS-470Ω	
R24	470KΩ	½	23X20X474K		
R25	1000Ω	½	23X20X102K	BTS-1000	
R26	220Ω	½	23X20X221K	BTS-220	
R27	47Ω	½	23X20X470K	BTS-47	
R28	1000Ω	½	23X20X102K	BTS-1000	
R29	180Ω	½	23X20X181K	BTS-180	
R30	1000Ω	½	23X20X102K	BTS-1000	
R31	47Ω	½	23X20X470K	BTS-47	
R32	12KΩ	½	23X20X123K	BTS-12K	
R33	1000Ω	½	23X20X102K	BTS-1000	
R34	1000Ω	½	23X20X102K	BTS-1000	
R35	180Ω	½	23X20X181K	BTS-180	
R36	1Meg	½	23X20X105K	BTS-1Meg	
R37	1.5KΩ	½	23X20X152K	BTS-1500	
R38	1Meg	½	23X20X105K	BTS-1Meg	
R39	820Ω	½	23X20X821K	BTS-820	
R40	33KΩ	½	23X40X333K	BTS-33K	
R41	550Ω 5%	½	24B1046		
R42	18KΩ	½	23X20X183K	BTS-18K	
R43	1Meg	½	23X20X105K	BTS-1Meg	
R44	33KΩ	½	23X20X334K	BTS-330K	
R45	390KΩ	½	23X20X394K	BTS-390K	
R46	820KΩ	½	23X20X824K	BTS-820K	
R47	100KΩ	½	23X20X104K	BTS-100K	
R48	18KΩ	½	23X20X183K	BTS-18K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	Hallicrafters PART No.	IRC PART No.	
R49	150Ω	½	23X20X151K	BTS-150	
R50	5600Ω	½	23X20X562K	BTA-5600	
R51	470Ω	½	23X20X471K	BTS-470	
R52	560KΩ 5%	½	23X20X564J	BTS-560	
R53	470KΩ 5%	½	23X20X474J	BTS-470K	
R54	18KΩ	2	23X20X183K	BTS-18K	
R55A	220KΩ	2	⊤48A046	BTS-220K	
B	2.2Meg	2		BTS-2.2Meg	
R56	1Meg	½	23X20X105K	BTS-1Meg	
R57	47KΩ	½	23X20X473K	BTS-47K	
R58	680KΩ	½	23X20X684K	BTS-680K	
R59	6800Ω	½	23X20X682K	BTS-6800	
R60	470Ω	½	23X20X472K	BTS-470Ω	
R61A	22KΩ	½	⊤48A044	BTS-22K	
B	10KΩ	½		BTS-10K	
R62	560KΩ	1	23X40X684K	BTA-560K	
R63	15KΩ	2	23X40X153K	BTB-15K	
R64	15KΩ	2	23X40X153K	BTB-15K	
R65	68KΩ	½	23X20X683K	BTS-68K	
R66	560Ω	½			
R67	560Ω	½			
R68	560KΩ	½	23X20X564K		
R69	150KΩ	½	23X20X154K		
R70	150KΩ	½	23X20X154K		
R71	100KΩ	½	23X20X104K		
R72	100KΩ	½	23X20X104K	BTS-1000	
R73	27KΩ	½	23X20X273K	BTS-27K	
R74	100KΩ	½	23X20X104K		
R75	820Ω	½	23X20X822K		
R76	150KΩ	½	23X20X154K		
R77	2.7Meg	½	23X20X275K	BTS-2.7Meg	
R78	18KΩ	½	23X20X183K		
R79	390KΩ	½	23X20X394K		
R80	12KΩ	2	23A097		
R81	100Ω	½	23X20X101K		
R82	470Ω 5%	½	23X20X472J	BTS-470Ω 5%	Note 1
R83	2.2Ω	5		BW-2.2	
R84	7.2Ω	5	25B1031		
R85	33KΩ	1	23X20X333K	BTA-33K	

Note 1. Not used in Run 2, Chassis A1850D, B1850D, C1850D, D1850D.
† Items C58A, C58B, C58C, R55A, R55B are combined in one unit.
• Items C61A, C61B, R61A, R61B are combined in one unit.

TRANSFORMER (FILAMENT)

ITEM No	RATING				REPLACEMENT DATA					
	PRI	SEC. 1	SEC. 2	SEC. 3	Hallicrafters PART No	Halldorson PART No.	Merit PART No	Stancor PART No	Thordarson PART No	Triad PART No
T1	117VAC	5.3VAC @ 3A			52C322				26F64	
	Tap @ 235VAC	@ 1.2A								
	@ 52A									
	Tap @ 6.3VAC @ 8A									

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No	USE	REPLACEMENT DATA							
		Hallicrafters PART No	Halldorson PART No	Merit PART No	RCA TYPE No	Ram PART No	Stancor PART No	Thordarson PART No	Triad PART No
T2	Vert.Osc.Trans.	55B250	B8704	A-3006					
T3	Horiz.Output Trans.	55D270 ①	FB418 •	HVO-37 •		X123 •	A-8263 •	FLY-25 •	D-48 •
		55D274 ②	FB418 •	HVO-37 •		X123 •	A-8263 •	FLY-25 •	D-48 •
T4	Vert. Output Trans.	55C260	21R07	A-3824					
T5A	Yoke(90°) Horiz.	53D325	DF607 ③ ⑤	MDF-82 ⑤⑥	235D14 ④ ⑤	Y90P19/43 ⑤⑥	DY-16A ③ ⑤	Y-16 ③④⑤	Y-41-1 ④⑤
B	Vert. (60CPS)								

① Used in chassis stamped Run 1, Run 1A.
② Used in chassis stamped Run 2.
③ Use original rear cover and centering device.
④ Use original horizontal damping network.
⑤ Jumper terminals #3 and #6.

• HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type is Listed

	ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
	4	4	6	6	2	6	6	6
	5	5	3	3	7	3	3	3
	NC	5	5		2	5	5	5
	6	6	2	2	6	2	2	2
Special Notes	①	①						

① Connections for part #55D274.
② Connections for part #55D270.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA					NOTES
	PRI	SEC.	Hallicrafters PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T6	2.4KΩ	3.3Ω	55B240	Z1U01	A-3025	A-3323	26S56 ①	S-13X	① Drill one new mtg. hole.

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP	Hallicrafters PART No.	CHAM PART No.	
SP1	4"	PM	3.3Ω	85C175A ①	4A07	① Used in Models 21T420B, 21T420M, 21T421B, 21T421M, 24T430D,24T430M, 24T431B, 24T431M
	6"	PM	3.3Ω	85C177 ②	6A1	② Used in Models 21K330BA and 21K330BA

COILS (RF-IF)

ITEM No.	USE	DC RES		REPLACEMENT DATA			NOTES
		PRI	SEC.	Hallicrafters PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Ant. Matching Trans.	0Ω	0Ω					
L2	Ant. Matching Trans.	0Ω	0Ω					
L3	IF Trap							
L4	FM Trap							
L5A	Ant.,RF, Mixer,Grid & Osc. Coils	0Ω		121-1010				Channel 2
B	Ant., RF Mixer Grid & Osc. Coils	0Ω		121-1011				Channel 3
C	Ant., RF Mixer Grid & Osc. Coils	0Ω		121-1013				Channel 4
D	Ant., RF Mixer Grid & Osc. Coils	0Ω		121-1013				Channel 5
E	Ant., RF Mixer Grid & Osc. Coils	0Ω		121-1014				Channel 6
F	Ant., RF Mixer Grid & Osc. Coils	0Ω		121-1015				Channel 7
G	Ant.,RF Mixer Grid & Osc. Coils	0Ω		121-1016				Channel 8
H	Ant., RF Mixer Grid & Osc. Coils	0Ω		121-1017				Channel 9
I	Ant., RF Mixer Grid & Osc. Coils	0Ω		121-1018				Channel 10
J	Ant., RF Mixer Grid & Osc. Coils	0Ω		121-1019				Channel 11
K	Ant.,RF Mixer Grid & Osc. Coils	0Ω		121-1020				Channel 12
L	Ant., RF Mixer Grid & Osc. Coils	0Ω		121-1021				Channel 13
L6	Heat.Coil	0Ω						
L7	RF Coil	0Ω						
L8	Conv.Plate	.1Ω		121-1004				

PROPERTY OF L. F.

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (cont)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA Hallicrafters PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L9	1st. Video IF	.1Ω		51A1926	17-4504 *	TV-125 ■	6234 ■	
L10	2nd. Video IF	.1Ω		51A1925	17-4501 *	TV-130 ▲	6225	
L11	Fil. Choke	0Ω		53A282	19-3001		6175	.4 Microhenry
L12	3rd. Video IF	.1Ω		51B1948	17-4501	TV-132	6221 ▲	Includes 41.25MC trap
L13	4th. Video IF	.2Ω	.2Ω	50A654	17-5004 ♦	TV-125 ♦	6234 ♦	
L14	Series Peaking Coil	4.4Ω		53A307	19-1006		4624	16 Microhenries
L15	Series Peaking Coil	6Ω		51A1952	19-4160	TV-184 †	6120 †	160 Microhenries, wound on 22KΩ resistor
L16A	4.5MC Trap	2.9Ω						
B	1st. Sound IF	.9Ω		51A1858 ▲				
L17	Series Peaking Coil	12Ω		51A1947	19-3500 #		6144 #	575 Microhenries, wound on 18KΩ resistor
L18	Shunt Peaking Coil	17Ω		51A1946	19-4950		4652	1060 Microhenries
L19	2nd. Sound IF	1.8Ω	3.9Ω	51A1859				
L20	Quadrature Coil	5.2Ω		51A1857	20-1005	TV-151	1480	
L21	RF Choke	5.5Ω		53A342				7.5 Microhenries (IRC part #CLA)

* Detune trap.
▲ Alternate part #51A1996.
♦ Use adaptor plate.
■ Cut out chassis hole. Use one winding and adaptor plate.
▲ Use one winding only.
† Parallel with 22KΩ resistor.
# Parallel with 18KΩ resistor.

TRANSFORMER (HORIZ. OSC.)

ITEM No.	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA Hallicrafters PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	RCA TYPE No.	Ram PART No.	Thordarson PART No.	NOTES
L22	16Ω	35Ω	50C648	20-1402¶	TV-162 ¶	6183¶	205R1¶		HS-3¶	Waveform Winding-35Ω

¶ Reverse coil mounting in can.

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	RATINGS D. C. RESISTANCE	RATINGS INDUCTANCE (0 CURRENT 1000 ~)	REPLACEMENT DATA Hallicrafters PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L23	.200ADC	53Ω	.85HY	56B187	C5040	C-2994	C-2327	26C41	C-21X

SELENIUM RECTIFIER

ITEM No.	RATING CURRENT	REPLACEMENT DATA Hallicrafters PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	RADIO RECEPTOR PART No.	SARKES TARZIAN PART No.	NOTES
M1	.200ADC	27A218A	1236A	RS-250	6S300	6Q4	300	
M2	.200ADC	27A218A	1236A	RS-250	6S300	6Q4	300	

MISCELLANEOUS

ITEM No.	PART NAME	Hallicrafters PART No.	NOTES
M3	Tuner	1D2249	VHF - Chassis A1850D, C1850D
M4	Tuner	1D2283	VHF-UHF - Chassis B1850D, D1850D
M5	Switch	60A693	AGC (3 position - slide type)
M6	Centering Device		Part of deflection yoke (T5) rear cover
M7	Ion Trap	21B189	
B3	Trimmer Cap.	44A448	Horiz. Lock (10-160MMF)

COMPARISON OF 1850D SERIES CHASSIS

The A1850D, Run 1 chassis is considered the standard for twenty-one inch television receivers in the 1850D series and C1850D, Run 1 chassis is standard for 24 inch receivers. Advanced run numbers will indicate variations from this standard by one or more modifications as listed below.

CHASSIS	PICTURE TUBE SIZE	PICTURE TUBE TYPE	HEATER CIRCUIT	TUNER	MODIFICATIONS
A1850D-Run 1	21"	Glass 21ALP4A	Transformer	1D2249	
Run 1A	21"	Glass 21ALP4A	Transformer	1D2249	I
Run 2	21"	Glass 21ALP4A	Transformer	1D2249	I, II
B1850D-Run 1	21"	Glass 21ALP4A	Transformer	1D2283	
Run 1A	21"	Glass 21ALP4A	Transformer	1D2283	I
Run 2	21"	Glass 21ALP4A	Transformer	1D2283	I, II
C1850D-Run 1	24"	Glass 24DP4A	Transformer	1D2249	
Run 1A	24"	Glass 24DP4A	Transformer	1D2249	I
Run 2	24"	Glass 24DP4A	Transformer	1D2249	I, II
D1850D-Run 1	24"	Glass 24DP4A	Transformer	1D2283	
Run 1A	24"	Glass 24DP4A	Transformer	1D2283	I
Run 2	24"	Glass 24DP4A	Transformer	1D2283	I, II

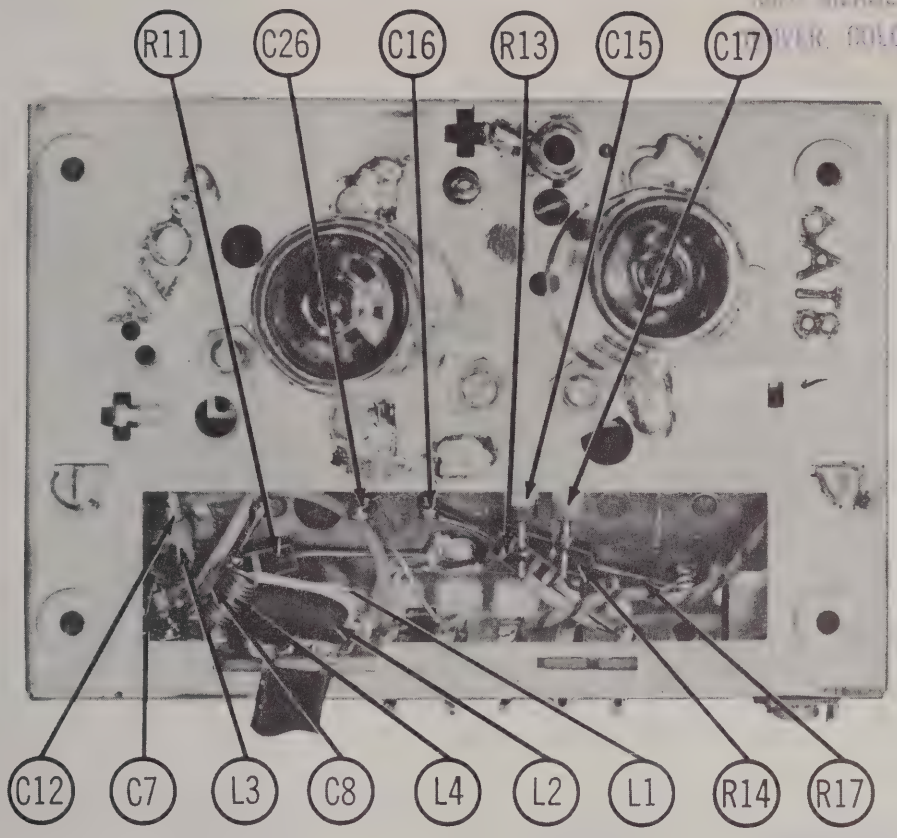
MODIFICATION I

LOCATION OF CHANGE	CHANGE MADE
A. Pin 7 of V6A.	A. L16 changed to part #51A1996.
B. Pin 8 of V5B.	B. See alternate circuit shown on page 2.

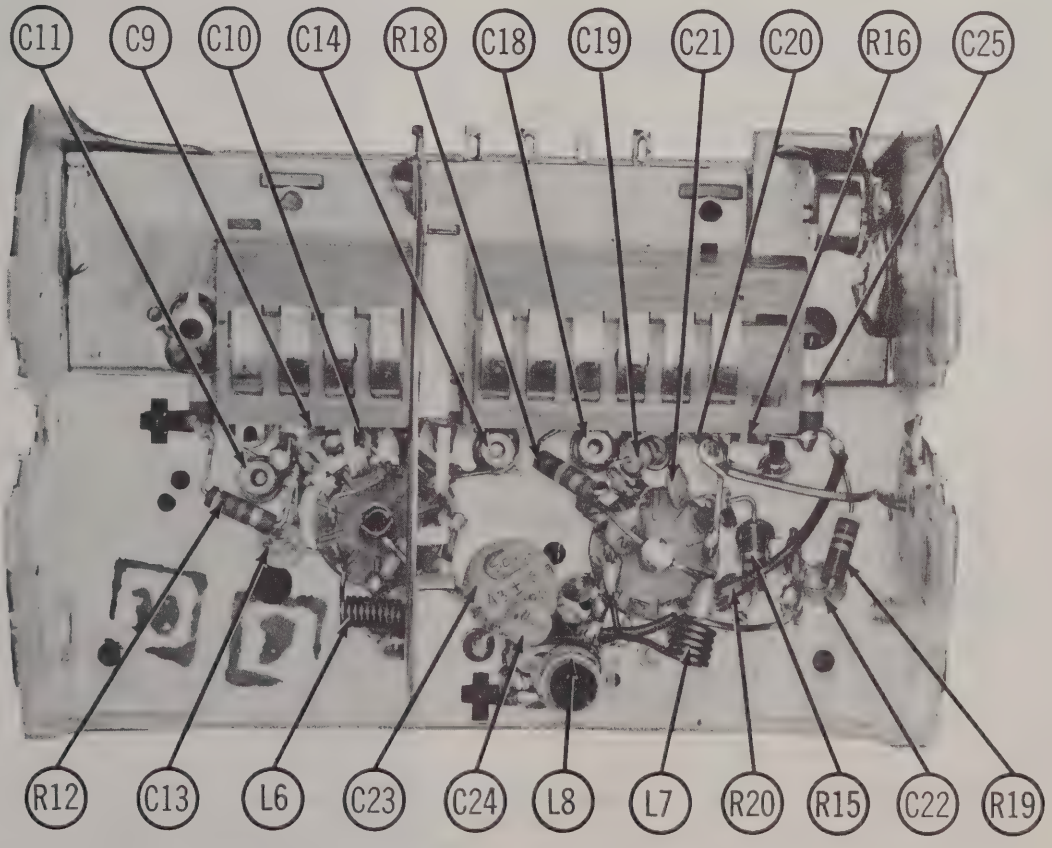
MODIFICATION II

LOCATION OF CHANGE	CHANGE MADE
A. Horizontal Output Transformer.	A. Horizontal output transformer changed to part #55D274.
B. Horizontal Output Transformer.	B. A 56MMF capacitor added from terminal 5 to terminal 6 of T3.
C. Deflection Yoke	C. C79 and C80 are omitted.

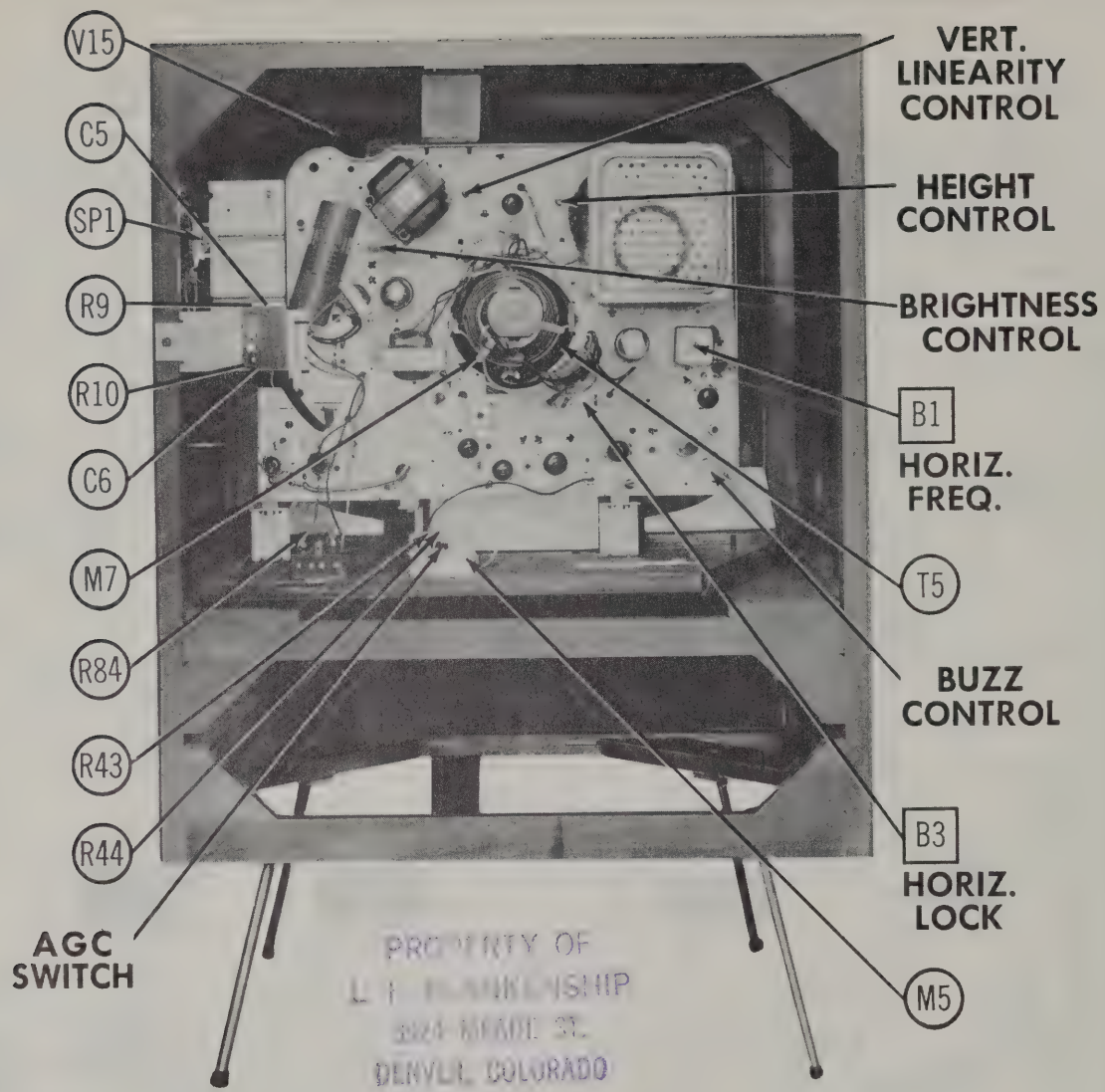
PROPERTY OF
E. F. HUTCHINSON
3800 MEADE ST.
DENVER, COLORADO



RF TUNER-TOP VIEW



RF TUNER-BOTTOM VIEW



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern.

Preset the horizontal lock trimmer (B3) one-half turn from its fully clockwise position,

Set the horizontal hold control to its mid-range position. If necessary, adjust the horizontal frequency slug (B1) to synchronize the picture horizontally.

Connect the vertical amplifier of an oscilloscope thru a 10MMF capacitor to lug 4 of L21.

Adjust the horizontal waveform slug (B2) for waveform similar to Fig. 6. If necessary, keep the picture in sync during this adjustment with the horizontal hold control or B1.

Disconnect the scope. Turn the horizontal hold control fully counter clockwise. Turn B1 counter clockwise until picture loses sync with diagonal bars sloping downward to the right.

Adjust B1 clockwise until picture is just ready to fall into sync. Turn horizontal control clockwise until picture loses sync. If picture is still in sync at maximum clockwise rotation of horizontal hold control switch off channel and back so, that picture will fall out of sync. Turn horizontal hold control slowly counter clockwise and note the number of diagonal bars present just before picture pulls into sync. If more than 3 bars are present adjust the horizontal lock trimmer (B3) slightly clockwise. If less than 2 bars are present adjust B3 slightly counter clockwise. Check horizontal hold control action. Picture should pull into sync within 60 degrees from fully counter clockwise rotation of horizontal hold control.

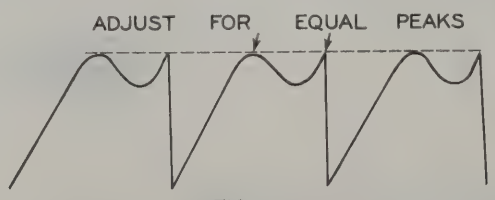
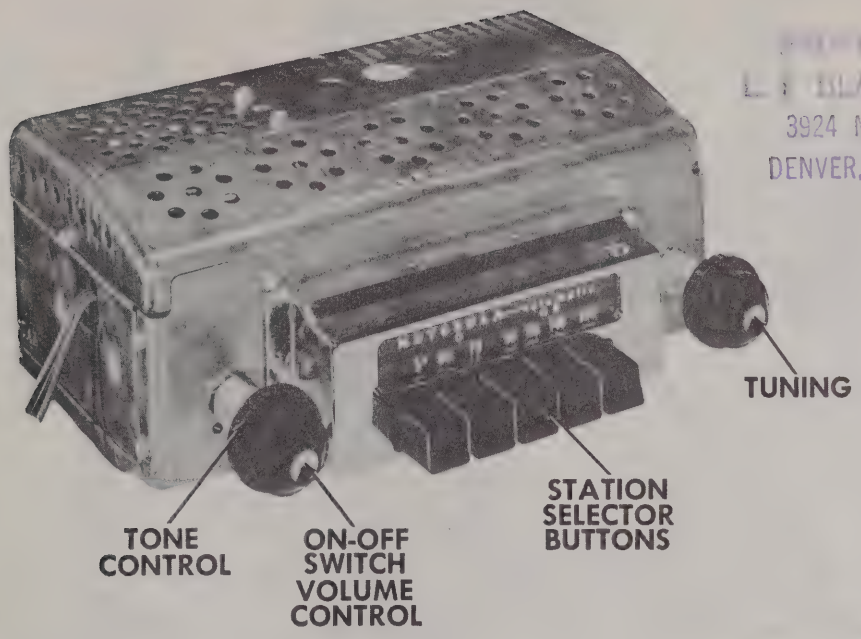


FIG. 6

PROPERTY OF
L. J. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

MOTOROLA
MODEL CTA5



TRADE NAME	Motorola Model CTA5 (For 1955 Chevrolet Cars)
MANUFACTURER	Motorola Inc., 4545 Augusta Blvd., Chicago 51, Ill.
TYPE SET	Battery Operated Custom Built AM Superheterodyne Automobile Receiver
TUBES (Six)	Types: 12BD6 RF Amp., 12BE6 Conv., 12BD6 IF Amp., 12CR6 Det. -AVC-AF Amp., 12AQ5 Output, 12X4 Rectifier
POWER SUPPLY	12 Volt Storage Battery — RATING 3.1 Amp. @ 12.6 Volts
TUNING RANGE—BROADCAST	540KC-1605KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 7 (grid) of 12BE6 (V2). Low side to chassis.	265KC (400~ Mod.)	High frequency end stop.	Across Voice Coil	A1, A2, A3, A4	Adjust for maximum output.
*2.	Fig. 1	Thru dummy to ant. receptacle.	1605KC	"	"	A5, A6, A7	"
3.	"	"	1200KC	Tune gang to 9/32" from high freq. end stop	"	A8, A9, A10 #	"
4.				Tune to station with weak signal around 1400KC		A7	With receiver installed in car, and antenna fully extended. Adjust A7 for maximum volume.

* Back tuner cores out of coils and remove escutcheon to expose core screws before proceeding with step 2.
\# Special alignment tool (Motorola part #66A76278) available for this adjustment.

PUSHBUTTON ADJUSTMENT

Pull out first pushbutton, tune receiver manually to desired frequency. Push button in firmly. Repeat for remaining buttons.

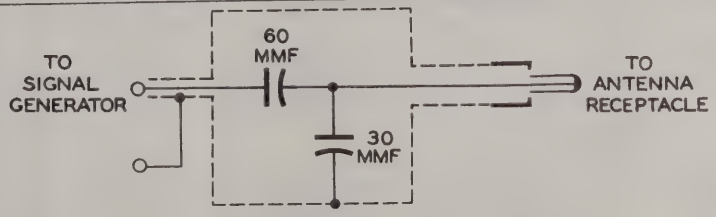


FIG. 1

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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PARTS LIST AND DESCRIPTIONS

MOTOROLA
Model CTA5

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		MOTOROLA PART No.	STANDARD REPLACEMENT		
V1	RF Amp.	12BD6	12BD6	7BK	
V2	Converter	12BE6	12BE6	7CH	
V3	IF Amp.	12BD6	12BD6	7BK	
V4	Det.-AVC-AF Amp.	12CR6	12CR6	7EA	
V5	Audio Output	12AQ5	12AQ5	7BZ	
V6	Rect.	12X4	12X4	5BS	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	MOTOROLA PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	■15	350	23A485677	AFH3-104	C077	FP328	TM-3026	T-455	TVL-3630
B	▲10	350							
C	20	25							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	MOTOROLA PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C2	90	500	21A591682	SI91	D6-910	5W5Q91	801-910		1FM-491	
C3	150		21R410112	BPD-00015	DD-151	G046	811-151	UC-5315	5GA-T15	
C4	560		21R120936	BPD-00056	DD-561	G063	811-561	UC-5356	5GA-T56	
C5	8.2		21R120547	NPO-SI8.2		Z016	NPOA-8R2			
C6	22		21R400935	SI22		G024	831-220	UC-5422	5GA-Q22	
C7	.05	400	8R121567	BPD-05	DF-503	CUB4S5		PT415	4TM-S5	
C8	.05	200	8R121005	BPD-05	DF-503	CUB2S5		PT415	2TM-S5	
C9	.01	400	8R121002	BPD-01	D6-103	CUB4S1	GP3-333-103	PT411	4TM-S1	
C10	.002	600	8R121568	SI2000	D6-202	CUB6D2	GP2-333-202	PT622	6TM-D2	
C11	.02	400	8R121566	BPD-02	DF-203	CUB4S2	817-02	PT412	4TM-S2	
C12	.1	400	8R121006	P488N-1	DF-104	CUB4P1		PT401	4TM-P1	
C13	.02	400	8R121566	BPD-02	DF-203	CUB4S2	817-02	PT412	4TM-S2	
C14	470		21R114554	BPD-00047	DD-471	K060	811-471	UC-5347	5GA-T47	
C15	.004	600	8R121000	BPD-004	D6-402	CUB6D4	GP2-333-402	PT624	6TM-D4	
C16	.02	1000	8R121004	P1089-02		CUB16S2		PT1612	MB-S2	
C17	.5	100	8K122076	P185N-5		MP2P5		RF-480	68P20	
C18	.5	100	8K122076	P185N-5		MP2P5		RF-480	68P20	
C19	.5	100	8K122076	P185N-5		MP2P5		RF-480	68P20	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	MOTOROLA PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	1Meg	½	18K534294		RTV-535C	QJ-854A♦		Tone (Panel)
B	250KΩ							Volume-Switch (Rear)
								Tap at 125KΩ

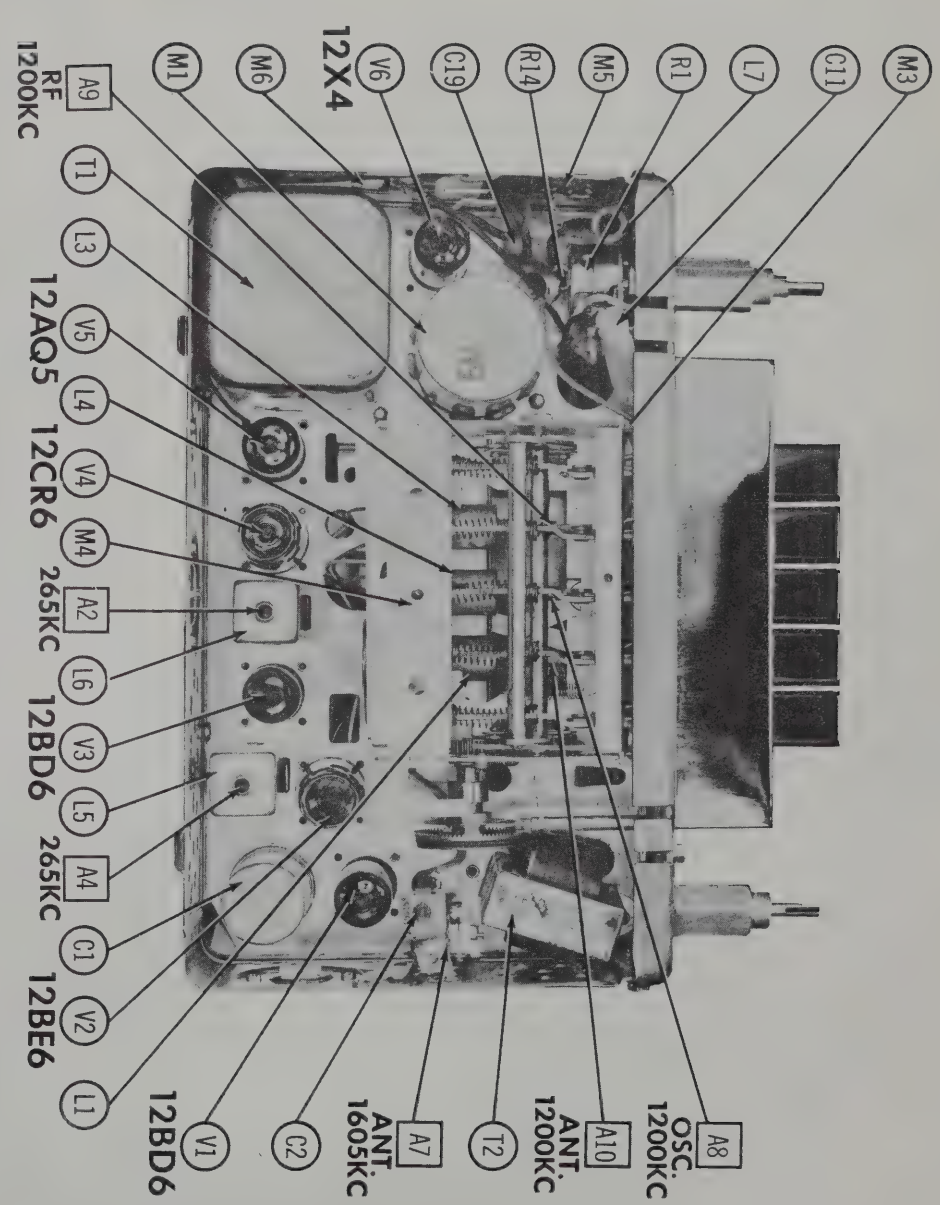
♦Concentrikit Equivalent, K-6 Kit, Base Elements and Shafts; B11-137, P13-118 (Panel)
B13-130X, R1-130 (Rear)
76-1 (Switch)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	MOTOROLA PART No.	IRC PART No.	
R2	1Meg	½	6R6004	BTS-1Meg	
R3	18KΩ	½	6R5591	BTS-18K	
R4	680Ω	½	6R6040	BTS-680	
R5	330KΩ	½	6R6014	BTS-330	
R6	47KΩ	½	6R6056	BTS-47K	
R7	330Ω	½	6R6010	BTS-330	
R8	8200Ω	2	6R5725	BTB-8200	
R9	560Ω	½	6R6291	BTS-560	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	MOTOROLA PART No.	IRC PART No.	
R10	1Meg	½	6R6004	BTS-1Meg	
R11	2.2Meg	½	6R3927	BTS-2.2Meg	
R12	1Meg	½	6R6004	BTS-1Meg	
R13	220KΩ	½	6R6015	BTS-220K	
R14	15KΩ	½	6R2119	BTS-15K	
R15	2700Ω	2	6R5764	BTB-2700	
R16	270Ω	1	6R6336	BTA-270	
R17	220KΩ	½	6R6015	BTS-220K	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (VIBRATOR)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	12.6VCT @1.6A	560VCT .052ADC			25C530737-A					

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	5.7KΩ	3.2Ω	25B500727-F	Z1107	A-2930	A-3877	24S51	S-3X	

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	MOTOROLA PART No.	QUAM PART No.	
SP1	6"x 9"	PM	3.2Ω	50C534819	69A3	

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	MOTOROLA PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Ant. Coil	14Ω		24K533629				Core Part No. 76K533627
L2	IF Trap			24A532108				
L3	RF Coil	14Ω		24K533629				Core Part No. 76K533627
L4	Osc. Coil	.8Ω	3.1Ω	24K533628				Core Part No. 76K533630
L5	Input IF	48Ω	48Ω	24B532152	16-6752	BC-350	12-H1	
L6	Output IF	46Ω	46Ω	24K532153	16-6754	BC-354	12-H6	
L7	Fil. Choke	0Ω		24K534323	19-4215	BC-537	5221	1 Microhenry
L8	Vib. Hash Choke	.1Ω		24A521816				18 Microhenries

VIBRATOR

ITEM No.	TYPE	INPUT VOLTS	FREQUENCY	REPLACEMENT DATA				NOTES
				MOTOROLA PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	RADIART PART No.	
M1	Interruptor	12.6	115v	48B522000	6326	G859	6326	

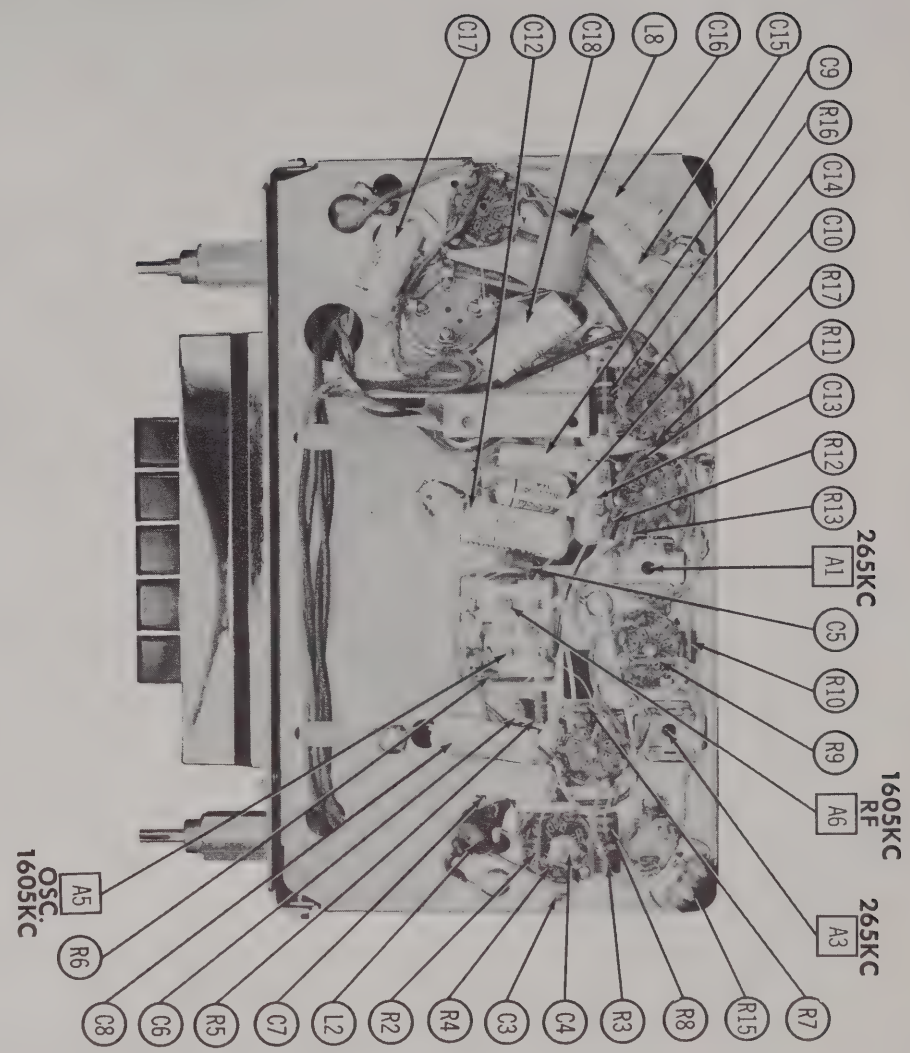
FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			MOTOROLA PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M2	SFE	9A	65K16248		307009. (SFE 9A)		SFE9	

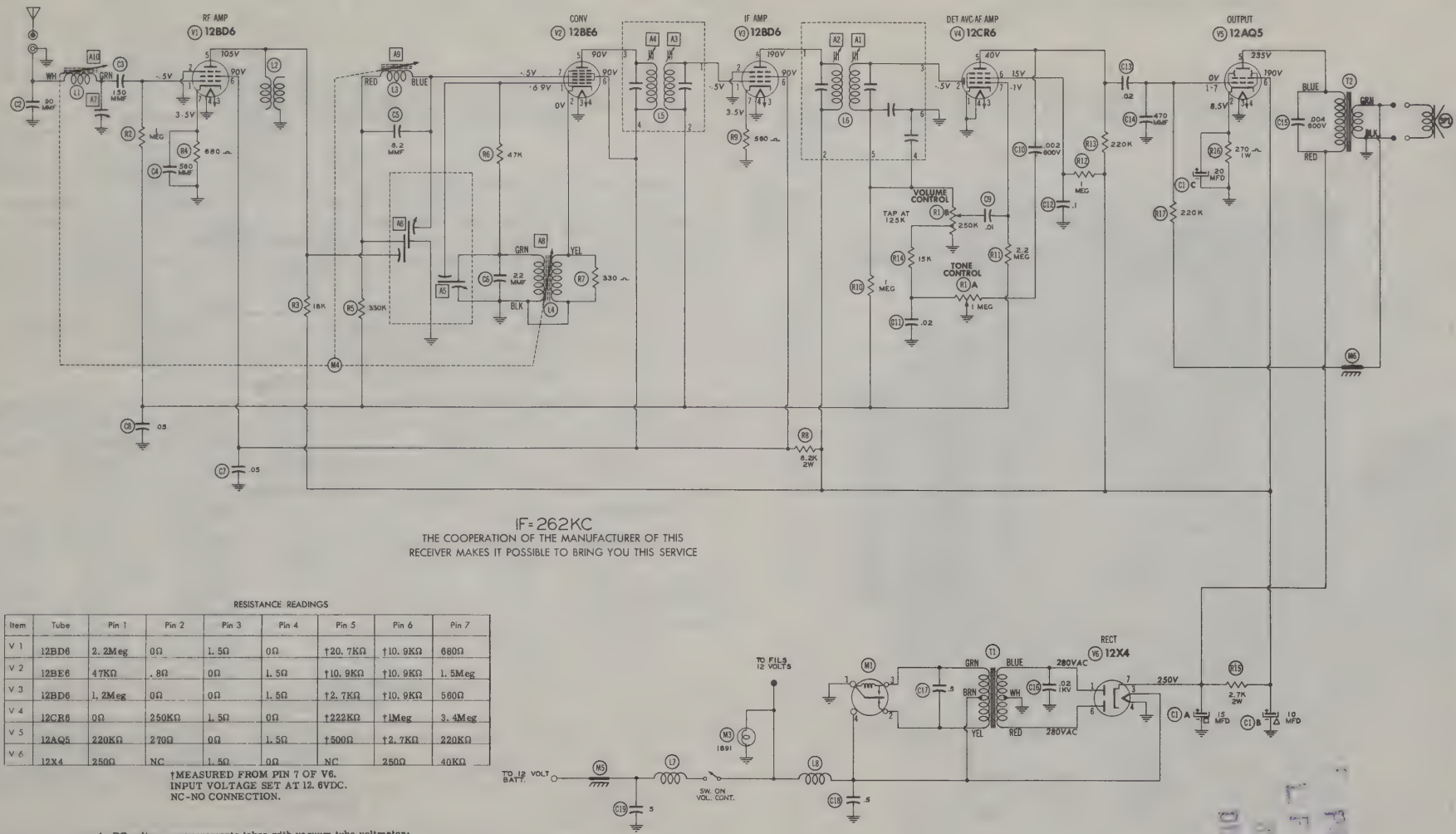
MISCELLANEOUS

ITEM No.	PART NAME	MOTOROLA PART No.	NOTES
M3	Dial Light	65T533821	#1891
M4	Tuner	77D534325	Permeability-Complete
M5	Spark Plate	64K530177	"A" Lead
M6	Spark Plate	64K530177	Speaker
A5, A6	Trimmer Cap.	20B534320	Dual-Osc. Trimmer (460MMF Nom.) & RF Trimmer (40MMF Nom.) Also Consists of Following Fixed Capacitors: 2 (47MMF) and one (1) 200-230MMF capacitors
A7	Trimmer Cap.	20A501419	Ant. (50MMF Nom.)
	Knob	36B534306	Dummy
	Knob	36K534307	Tone
	Knob	36B534305	On-off-volume & tuning
	Push Button	38B534308	5 used
	Pointer	1V534339	
	Dial Scale	34B534324	

CHASSIS—BOTTOM VIEW



MOTOROLA Model CTA5



IF = 262KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BD6	2.2Meg	0Ω	1.5Ω	0Ω	†20.7KΩ	†10.9KΩ	680Ω
V 2	12BE6	47KΩ	.8Ω	0Ω	1.5Ω	†10.9KΩ	†10.9KΩ	1.5Meg
V 3	12BD6	1.2Meg	0Ω	0Ω	1.5Ω	†2.7KΩ	†10.9KΩ	560Ω
V 4	12CR6	0Ω	250KΩ	1.5Ω	0Ω	†222KΩ	†1Meg	3.4Meg
V 5	12AQ5	220KΩ	270Ω	0Ω	1.5Ω	†500Ω	†2.7KΩ	220KΩ
V 6	12X4	250Ω	NC	1.5Ω	0Ω	NC	250Ω	40KΩ

†MEASURED FROM PIN 7 OF V6.
INPUT VOLTAGE SET AT 12.6VDC.
NC-NO CONNECTION.

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Battery voltage maintained at 12.6 volts for voltage readings.
5. Nominal tolerance on components values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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OLYMPIC MODEL 21TC54 (Ch. AC)

TRADE NAME	Olympic	MODELS	CHASSIS
		17CA20, 17CA20X, 17TA19, 17TA19BX, 17TA32, 17TA33	AA
		21CB35, 21CB41, 21DB71, 21KB24, 21KB26, 21KB36, 21KB76, 21TB34, 21TB40, 22DB101, 22DB116, 22DB120, 22DB121, 22DB122, 22DB123, 22DB124	AB
		21CC55, 21CC70, 21DC71, 21KC44, 21KC46, 21KC56, 21TC54, 22DC100, 22DC101, 22DC116, 22DC120, 22DC121, 22DC122, 22DC123, 22DC124	AC
		24CJ68	AJ
		24CJ68BK, 24CJ68MK, 24CK77	AK

MANUFACTURER	Olympic Radio & Television Inc., 34-01 38th. Ave., Long Island City 1, N.J.
TYPE SET	Television Receiver
TUBES	Seventeen
POWER SUPPLY	110-120 Volts AC-60 Cycle RATING 1.68 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13, Video IF 26.25MC, Sound IF 21.75MC (Intercarrier)

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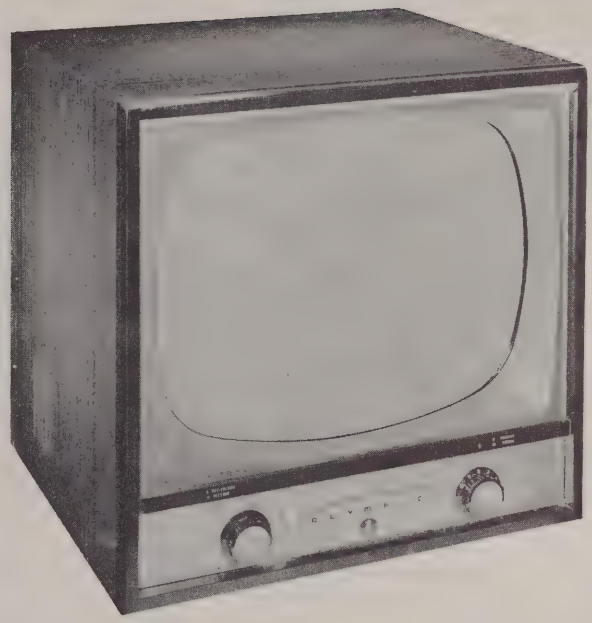
DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 4 push-on type control knobs from front panel of cabinet.
2. Remove 2 metal screws. Remove rear cover.
3. Disconnect speaker leads.
4. Remove 4 chassis bolts. Remove chassis.
5. Remove 2 speaker nuts. Remove speaker.



CHASSIS

AA, AB, AC, AJ, AK

OLYMPIC MODELS 17CA20, X, 17TA19, BX, 17TA32, 17TA33, 21CB35, 41, 21CC55, 70, 21DB71, 21DC71, 21KB24, 26, 36, 76, 21KC44, 46, 56, 21TB34, 40, 21TC54, 22DB Series, 22DC Series, 24CJ68, BK, MK, 24CK77 (Ch. AA, AB, AC, AJ, AK)

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF tuner oscillator circuit may be accomplished by removal of the channel selector and fine tuning knobs. The adjustments are accessible, one at a time, thru the small hole in the cabinet to the right of the channel selector shaft.

PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass, remove 3 wood screws holding wood strip at the top edge of the safety glass. Remove wood strip and safety glass. Use extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION

See tube placement chart on page 5.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Adjustment of the horizontal oscillator can be made from the rear panel of the chassis. Set the horizontal hold control at the center of its range and adjust the horizontal frequency slug (B1) until picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the buzz control (R7) for maximum volume and minimum buzz.

FUSES

One fuse is used for horizontal sweep circuit protection. (For location see tube placement chart).

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly centered.

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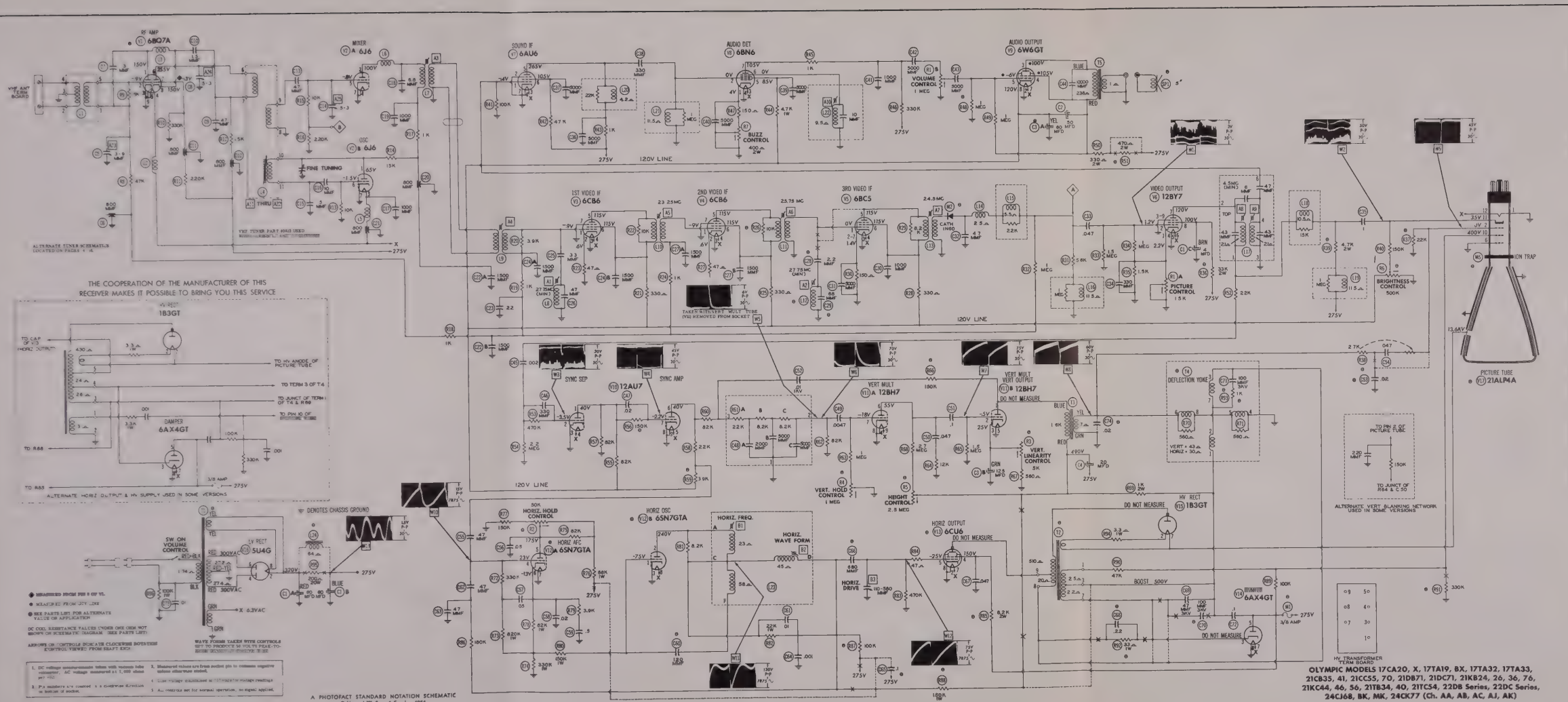
RF AMP V1 6BQ7A
MIXER V2A 6J6
OSC V2B 6J6
FINE TUNING
THRU
SOUND IF V7 6AU6
AUDIO DET. V8 6BN6
VOLUME CONTROL 1 MEG
BUZZ CONTROL 400 2W
AUDIO OUTPUT V9 6W6GT
120V LINE
1ST VIDEO IF V3 6CB6
2ND VIDEO IF V4 6CB6
3RD VIDEO IF V5 6BC5
23.25MC
25.75 MC
24.5MC
27.75MC (MIN.)
TAKEN WITH VERT MULT TUBE (V12) REMOVED FROM SOCKET
VIDEO OUTPUT V6 12BY7
PICTURE CONTROL 1.5K
BRIGHTNESS CONTROL 500K
PICTURE TUBE V17 21ALP4A
ION TRAP
13.6KV
SYNC SEP
SYNC AMP
V10 12AU7
VERT MULT V11A 12BH7
VERT MULT VERT OUTPUT V11B 12BH7
DO NOT MEASURE
DEFLECTION YOKE
VERT. LINEARITY CONTROL 5K
VERT. HOLD CONTROL 1 MEG
HEIGHT CONTROLS 2.5 MEG
VERT + 43 HORIZ + 30
ALTERNATE VERT BLANKING NETWORK USED IN SOME VERSIONS
HV RECT V15 1B3GT
HORIZ OSC V12B 6SN7GTA
HORIZ AFC V12A 6SN7GTA
50K HORIZ. HOLD CONTROL
HORIZ. FREQ.
HORIZ. WAVE FORM
HORIZ. DRIVE
HORIZ OUTPUT V13 6CU6
BOOST 500V
DAMPER 6AX4GT
V14 6AX4GT
HV TRANSFORMER TERM BOARD
LV RECT 5U4G
SW ON VOLUME CONTROL
DENOTES CHASSIS GROUND
WAVE FORMS TAKEN WITH CONTROLS SET TO PRODUCE 50 VOLTS PEAK-TO-PEAK HORIZONTAL SYNC PULSE
THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
HV RECT 1B3GT
DAMPER 6AX4GT
ALTERNATE HORIZ OUTPUT & HV SUPPLY USED IN SOME VERSIONS
ALTERNATE TUNER SCHEMATICS LOCATED ON PAGES 4 & 5
THE TUNER PART #'S ARE USED
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OLYMPIC MODELS 17CA20, X, 17TA19, BX, 17TA32, 17TA33, 21CB35, 41, 21CC55, 70, 21DB71, 21DC71, 21KB24, 26, 36, 76, 21KC44, 46, 56, 21TB34, 40, 21TC54, 22DB Series, 22DC Series, 24CJ68, BK, MK, 24CK77 (Ch. AA, AB, AC, AJ, AK)

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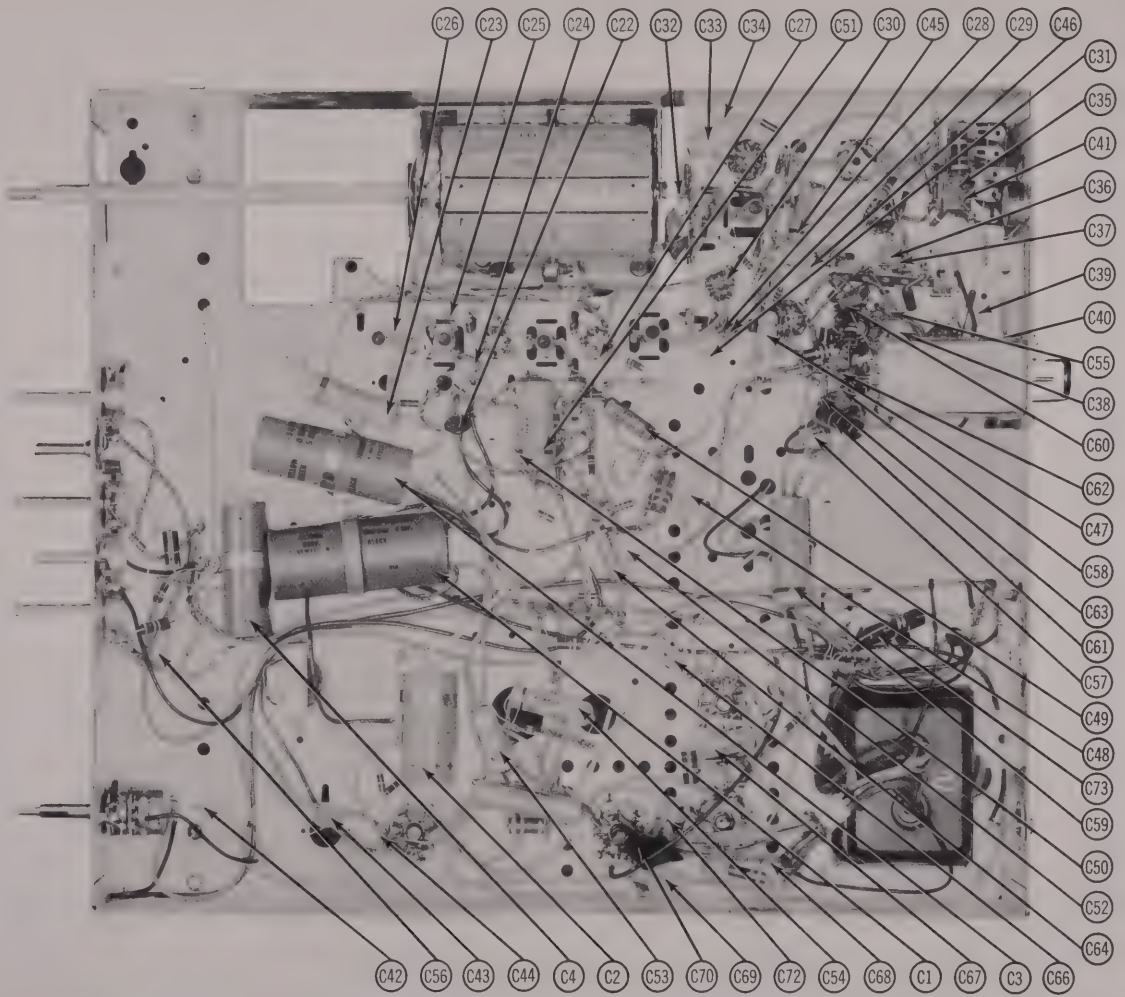
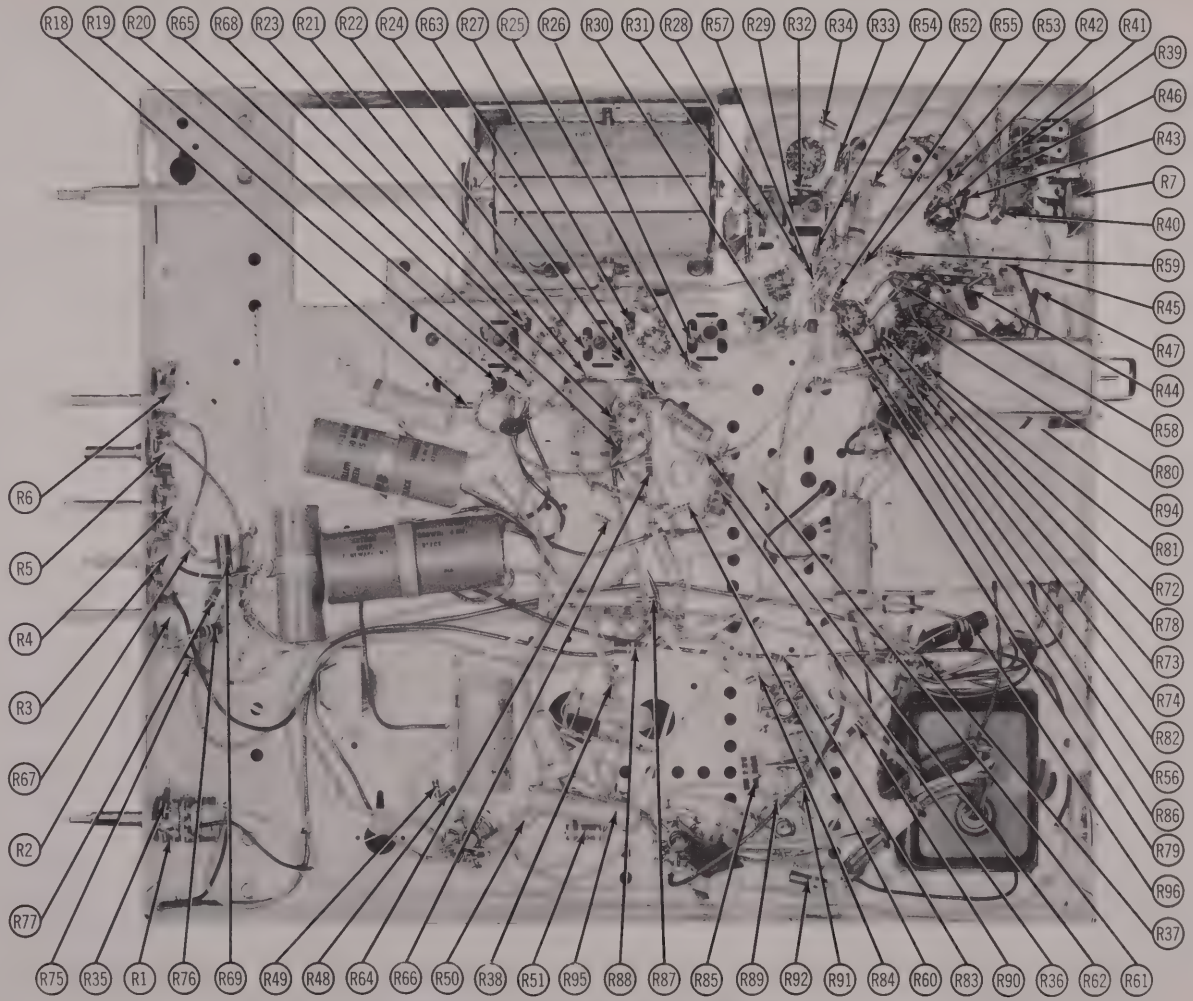


CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

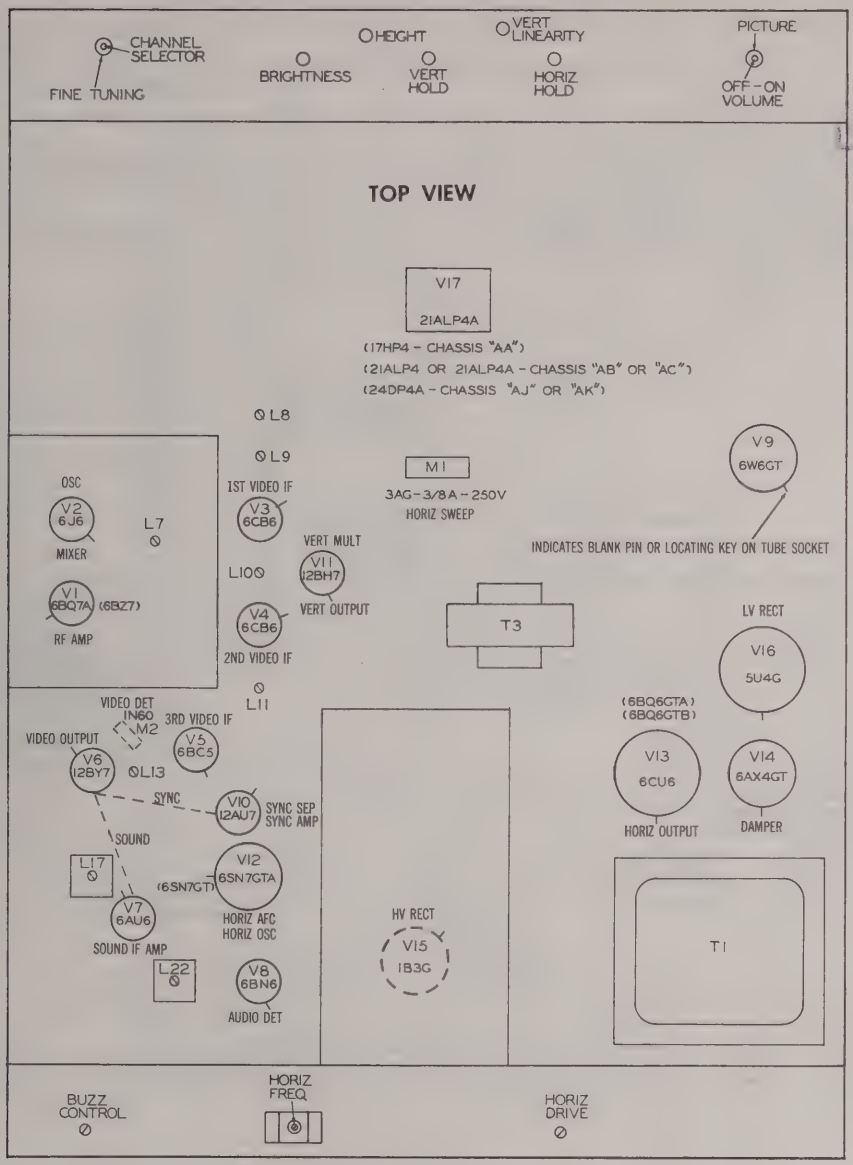
OLYMPIC MODELS 17CA20, X, 17TA19, BX, 17TA32, 17TA33, 21CB35, 41, 21CC55, 70, 21DB71, 21DC71, 21KB24, 26, 36, 76, 21KC44, 46, 56, 21TB34, 40, 21TC54, 22DB Series, 22DC Series, 24CJ68, BK, MK, 24CK77 (Ch. AA, AB, AC, AJ, AK)



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

OLYMPIC MODELS 17CA2O, X, 17TA19, BX, 17TA32, 17TA33, 21CB35, 41, 21CC55, 70, 21DB71, 21DC51, 21MB24, 26, 36, 76, 21MC44, MO, 56, 21TB84, MO, 21TE84, 22DB Series, 22DC Series, 24CJ68, BK, MK, 24CK77 (Ch. AA, AB, AC, AJ, AK)

TUBE PLACEMENT CHART



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TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - **V16**

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - **V2, V3, V4, V5, V6, V9**
No pic, no sound, has snow - **V1, V2, V3**
No pic, has sound, has raster - **V6, V17**
Has pic, no sound - **V7, V8, V9**

SYNC FAILURE
No vert. sync - **V10, V11**
No horiz. sync - **V10, V12**
No vert. or horiz. sync - **V10**

SWEEP FAILURE
No raster, has sound - **V12, V13, V14, V15, V17, Fuse (M1)**
No vertical deflection - **V11**
Poor vert. linearity or foldover - **V11**
Poor horiz. linearity or foldover - **V12, V13, V14**
Narrow picture - **V12, V13, V14, V15, V16**
Vert. off freq. - **V10, V11**
Horiz. off freq. - **V10, V12**

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage lead should be securely taped and kept away from chassis. Do not remove the horizontal oscillator tube (V12) to disable the high voltage.

VIDEO IF ALIGNMENT

Remove the converter tube (V2) from its socket and replace with a 6J6 which has pin 1 removed. This will disable the local oscillator and reduce the possibility of erroneous indications.
Use lowest DC scale on VTVM. If oscillation occurs during alignment (varying signal generator output will have no effect on VTVM reading) detune A7 and adjust A5 and A6 as in steps 4 and 5, then adjust A7 as in step 6.
In steps 3 and 7 use only enough sweep generator output for useable pattern on scope.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Direct	High side to an ungrounded tube shield floating over dummy converter tube, low side to chassis.	Not used	21. 75MC (Unmod.)	Any	Use VTVM . DC probe thru 100KΩ to point Ⓐ. Common to chassis.	A1	Adjust for MINIMUM deflection.
2.	"	"	"	27. 75MC	"	"	A2	Adjust for MINIMUM deflection. Used in "AC" models only.
3.	"	"	24MC (10MC Swp.)	21. 75MC 22. 75MC 26. 25MC	"	Vert. Amp. thru detector (Fig. 1) to pin 5 (plate) of first Video IF Tube (V3). Low side to chassis.	A3, A4	Connect a clip lead across C23, this shorts out AGC line. Remove the 3rd Video IF Amplifier Tube (V5) from its socket. Adjust A3 and A4 for response curve similar to Fig. 2 with marker positions as shown. Peaks should be of equal amplitude. Remove short from AGC line and replace V5 in its socket.
4.	"	"	Not used	23. 25MC (Unmod.)	"	Use VTVM. DC probe thru 100KΩ to point Ⓐ. Common to chassis.	A5	Adjust for maximum deflection.
5.	"	"	"	25. 75MC	"	"	A6	"
6.	"	"	"	24. 5MC	"	"	A7	"
7.	"	"	24MC (10MC Swp.)	21. 75MC 23. 0MC 26. 25MC 27. 75MC	"	Vert. Amp. to point Ⓐ. Low side to chassis.		Connect negative lead of a 1. 5 volt bias battery to ungrounded side of C23. Connect the positive lead to chassis. Check for response similar to Fig. 3. If necessary, slightly retouch A5, A6 and A7. A6 affects high frequency side. A5 affects low frequency side. A7 affects top portion of curve.

4.5MC TRAP ALIGNMENT

Remove 3rd video IF amplifier tube (V5) from its socket.
Set contrast control fully clockwise.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
8.	. 01MFD	High side to point Ⓐ. Low side to chassis.	4. 5MC (Unmod.)	Any	DC probe thru detector (Fig. 4) to pin 11 (cathode) of picture tube. Common to chassis.	A8	Adjust for MINIMUM deflection. Use maximum signal generator output. Replace V5 in its socket.

ALTERNATE 4. 5MC TRAP ALIGNMENT

Replace original 6J6 in its socket and tune in a local TV station. Adjust fine tuning control to emphasize 4. 5MC beat interference in picture. Adjust A8 to minimize the 4. 5MC beat in the picture.

SOUND IF ALIGNMENT USING ON THE AIR SIGNAL

Connect the DC probe of a VTVM to pin 2 of the audio detector tube (V8). Common to chassis. Replace the original 6J6 in its socket. Turn set on and tune in a strong TV signal. Adjust A9 for maximum deflection on VTVM. Disconnect VTVM from receiver. Set the buzz control (R7) to its mid-range position. Adjust the quadrature coil slug (A10) for maximum volume. Adjust R7 for maximum volume with minimum buzz. Retouch A9 for maximum volume.

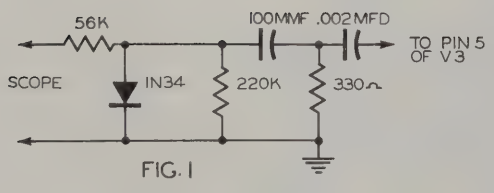

FIG. 1

FIG. 2

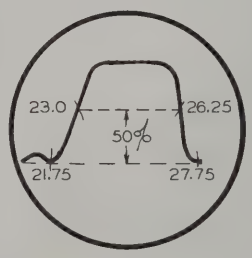

FIG. 3

ALIGNMENT INSTRUCTIONS (cont)

OSCILLATOR ALIGNMENT

Remove the dummy converter tube and replace the original 6J6 in its socket. Connect bias as in step 7 of "Video IF Alignment".
The channel oscillator adjustment screws are reached through a hole just to the right of the channel switch shaft. The correct adjustment screw is accessible through this hole as the channel switch is turned to each channel.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
9.	Two 120Ω Carbon Resistors	Across antenna terminal with 120Ω in each lead.	213MC (10MC Swp.)	211. 25MC 215. 75MC	13	Vert. Amp. thru 10KΩ to point (A). Low side to chassis.	A11	Adjust to place sound marker in trap notch as in Fig. 5. Video marker should be at 50%.
			207MC (10MC Swp.)	205. 25MC 209. 75MC	12		A12	
			201MC (10MC Swp.)	199. 25MC 203. 75MC	11		A13	
			195MC (10MC Swp.)	193. 25MC 197. 75MC	10		A14	
			189MC (10MC Swp.)	187. 25MC 191. 75MC	9		A15	
			183MC (10MC Swp.)	181. 25MC 185. 75MC	8		A16	
			177MC (10MC Swp.)	175. 25MC 179. 75MC	7		A17	
			85MC (10MC Swp.)	83. 25MC 87. 75MC	6		A18	
			79MC (10MC Swp.)	77. 25MC 81. 75MC	5		A19	
			69MC (10MC Swp.)	67. 25MC 71. 75MC	4		A20	
			63MC (10MC Swp.)	61. 25MC 65. 75MC	3		A21	
			57MC (10MC Swp.)	55. 25MC 59. 75MC	2		A22	

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RF AND MIXER ALIGNMENT

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50Ω.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	207MC (10MC Swp.)	205. 25MC 209. 75MC	12	Vert. Amp. thru 10KΩ to point (B). Low side to chassis.	A23, A24 A25	Adjust for response curve similar to Fig. 6 with markers above 90%.
11.	"	"	213MC (10MC Swp.)	211. 25MC 215. 75MC	13	"		Check for response curve similar to Fig. 6. If markers fall below 70% on any channel, make compromise adjustment of A23, A24 and A25 with channel switch set to that channel. Recheck all other channels to see that they have not been seriously affected.
			201MC (10MC Swp.)	199. 25MC 203. 75MC	11			
			195MC (10MC Swp.)	193. 25MC 197. 75MC	10			
			189MC (10MC Swp.)	187. 25MC 191. 75MC	9			
			183MC (10MC Swp.)	181. 25MC 185. 75MC	8			
			177MC (10MC Swp.)	175. 25MC 179. 75MC	7			
			85MC (10MC Swp.)	83. 25MC 87. 75MC	6			
			79MC (10MC Swp.)	77. 25MC 81. 75MC	5			
			69MC (10MC Swp.)	67. 25MC 71. 75MC	4			
			63MC (10MC Swp.)	61. 25MC 65. 75MC	3			
			57MC (10MC Swp.)	55. 25MC 59. 75MC	2			

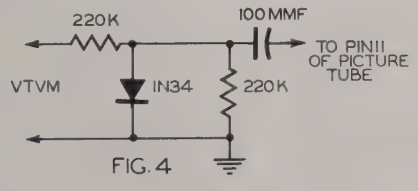


FIG. 4

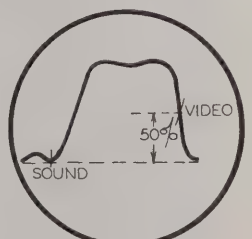


FIG. 5

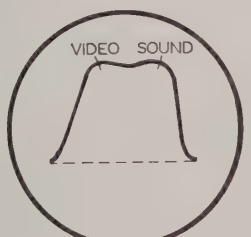
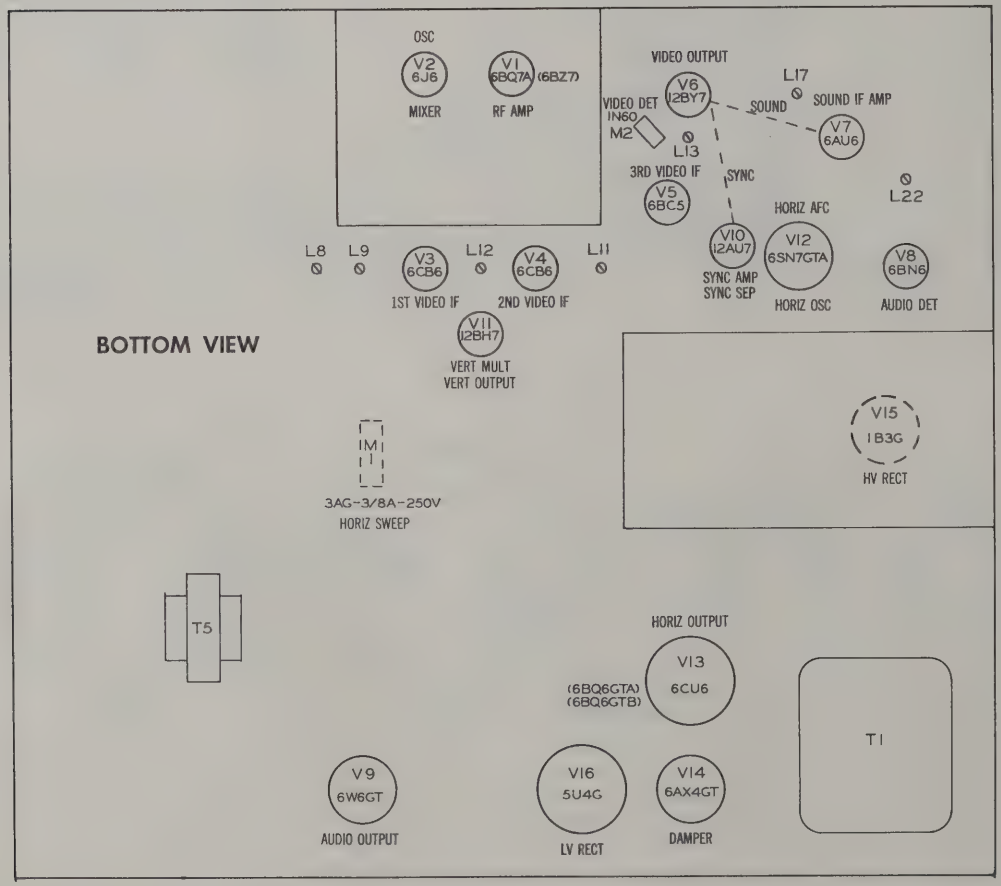


FIG. 6

RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BQ7A	INF	1Meg	0Ω	. 1Ω	0Ω	†1. 7KΩ	170KΩ	INF	0Ω
V 2	6J6	■15KΩ	■1KΩ	. 1Ω	0Ω	230KΩ	10KΩ	0Ω		
V 3	6CB6	1Meg	47Ω	0Ω	. 1Ω	■330Ω	■330Ω	0Ω		
V 4	6CB6	1Meg	47Ω	0Ω	. 1Ω	■330Ω	■330Ω	0Ω		
V 5	6BC5	. 1Ω	150Ω	0Ω	. 1Ω	■330Ω	■330Ω	0Ω		
V 6	12BY7	100Ω	700KΩ	0Ω	0Ω	0Ω	. 1Ω	†5KΩ	†33KΩ	0Ω
V 7	6AU6	100KΩ	0Ω	. 1Ω	0Ω	†1. 2KΩ	†47KΩ	0Ω		
V 8	6BN6	500Ω	11. 5Ω	. 1Ω	0Ω	■4. 7KΩ	9. 5Ω	†330KΩ		
V 9	6W6GT	TP	0Ω	†1. 2KΩ	†1KΩ	500KΩ	NC	. 1Ω	50KΩ	
V 10	12AU7	■60KΩ	3Meg	0Ω	. 1Ω	. 1Ω	■26KΩ	200KΩ	0Ω	0Ω
V 11	12BH7	▲2. 6KΩ	1. 5Meg	2. 2KΩ	0Ω	0Ω	▲3Meg	1. 5Meg	0Ω	. 1Ω
V 12	6SN7GTA	500KΩ	†70KΩ	0Ω	1. 5Meg	†70KΩ	400KΩ	0Ω	. 1Ω	
V 13	6CU6	TP	0Ω	NC	†8. 4KΩ	470KΩ	TP	. 1Ω	0Ω	TOP CAP ▲40Ω
V 14	6AX4GT	NC	NC	100KΩ	NC	†200Ω	NC	. 1Ω	0Ω	
V 15	1B3GT		PINS	1-8	HAVE	INF	RESISTANCE			TOP CAP ▲550Ω
V 16	5U4G	NC	50KΩ	TP	29Ω	TP	27Ω	NC	50KΩ	
V 17	21ALP4A	0Ω	22KΩ	PIN 6 0Ω	PIN 10 ▲47KΩ	PIN 11 ■250KΩ	PIN 12 . 1Ω			

†MEASURED FROM PIN 2 OF V16.
■MEASURED FROM 120 VOLT LINE
▲MEASURED FROM PIN 3 OF V14.
TP-TIE POINT.
NC-NO CONNECTION.



TUBE PLACEMENT CHART

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: OLYMPIC PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	RF Amp.	6BQ7A	6BQ7A	9AJ	6BZ7 used as an alternate.
V2	Mixer-Osc.	6J6	6J6	7BF	
V3	1st Video IF Amp.	6CB6	6CB6	7CM	
V4	2nd Video IF Amp.	6CB6	6CB6	7CM	
V5	3rd Video IF Amp.	6BC5	6BC5	7BD	
V6	Video Output	12BY7	12BY7	9BF	
V7	Sound IF Amp.	6AU6	6AU6	7BK	
V8	Audio Det.	6BN6	6BN6	7DF	
V9	Audio Output	6W6GT	6W6GT	7AC	
V10	Sync Sep. - Sync Amp.	12AU7	12AU7	9A	
V11	Vert. Mult. - Vert. Output	12BH7	12BH7	9A	
V12	Horiz. AFC - Horiz. Osc.	6SN7GTA	6SN7GTA	8BD	6SN7GT used as an alternate.
V13	Horiz. Output	6CU6	6CU6	6AM	6BQ6GTA or 6BQ6GTB used as an alternate.
V14	Damper	6AX4GT	6AX4GT	4CG	
V15	HV Rect.	1B3GT	1B3GT	3C	
V16	LV Rect.	5U4G	5U4G	5T	

PROPERTY OF
E. F. BLANKENSHIP
3934 MEADE ST
DENVER, COLORADO

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA: OLYMPIC PART No.	CBS PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.	RETMA BASE TYPE	NOTES
V17	21ALP4A ①	21ALP4A ①	21ALP4A ①	21ALP4A ②	21ALP4A ①	12L	① Aluminized
		21ALP4		21ALP4	21ALP4	12L	② Silver screen
				21ALP4B ②		12L	
	17HP4	17HP4/17RP4	17RP4/17HP4	17HP4/ 17RP4	17HP4/17RP4		
		17HP4B ①		17HP4B ②			

ELECTROLYTIC CAPACITORS

ITEM No.	RATING: CAP.	RATING: VOLT.	REPLACEMENT DATA: OLYMPIC PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	60	350	CO3380	E59B264		WQ-795	TDL-D80-350	T-110	
B	60	350				TC60	TD-8-350	MT-4504	
C	4	350							
C2	50	250	CO2068	PRS250V50	BR5025	TC59	TD-50-450	MT-2540	TVA-1511
C3A	60	200	CO3596 -(Note 1)	E59B295			TD-60-350	D-322	TVA-1613
B	125	50					TD-150-50		TVA-1311
C4	20	450	CO2560	PRS450V20	BR2045	TC75	TD-20-450	FM-4520	TVA-1709

Note 1. Some versions may use a 40MFD unit in this application.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: OLYMPIC PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C5	3-9									
C6	800									
C7	3			NP0-DI3	TCZ-3R3	Z007	NP0A-030	ZT-553	5TCCB-V33	
C8	.5-3				829-3		3115-01-0R5	CT565A		
C9	47									
C10	1.5			NP0-SI1.5	TCZ-1R5	Z004	NP0A-1R5	ZT-5515	5TCCB-V15	
C11	800									
C12	800									
C13	47									
C14	.5-3				829-3		3115-01-0R5	CT565A		
C15	5									
C16	10			NP0-DI10	TCZ-10	Z018	NP0A-100	ZT-541	5TCC-Q1	
C17	1000			BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C18	6.8			NP0-DI6.8	TCZ-6R8	Z013	NP0A-6R8	ZT-5568	5TCCB-V68	
C19	1000			BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C20	800									
C21	800									
C22A	1500		CC2D-152K	BPD-2X0015	DD2-152	DK071	812-0015	DC-5215	5HK-2D15	
B	1500									
C23	.22	200	CO-H-2224	P288N-22		CUB2P22		PT4022	2TM-P22	
C24A	1500		CC2D-152K	BPD-2X0015	DD2-152	DK071	812-0015	DC-5215	5HK-2D15	
B	1500									
C25	3.3		CO3468	NP0-SI3.3	TCZ-3R3	Z008	NP0A-3R3	ZT-5533	5TCCB-V33	
C26	47			N750-SI47	TCN-47	TN14	N750K-470	NT-5447	5TCU-Q47	
C27A	1500		CC2D-152K	BPD-2X0015	DD2-152	DK071	812-0015	DC-5215	5HK-2D15	
B	1500									
C28	2.2			NP0-SI2.2	TCZ-2R2	TZ05	NP0A-2R2		5TCCB-V22	
C29	68			SI68	DD-680	TP32	801-680		5GA-Q68	
C30	1000		CCD-102X	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C31	5000		CCD-502X	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C32	4.7		CO-1083	NP0-SI4.7	TCZ-4R7	TZ07	NP0A-4R7	ZT-5547	5TCCB-V47	
C33	.047	400	CO-H-4473	BPD-05	DF-503			PT4147	4TM-S47	
C34	330		CCD-331M	SI330	DD-331	G056	811-331	UC-5333	5GA-T33	
C35	.1	400	CO-H-4104	P488N-1	DF-104	CUB4P1		PT401	4TM-P1	
C36	5000		CCD-502X	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C37	5000		CCD-502X	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C38	330		CCD-331M	SI330	DD-331	G056	811-331	UC-5333	5GA-T33	
C39	5000		CCD-502X	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C40	5000		CCD-502X	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C41	1000		CCD-102X	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C42	5000		CCD-502X	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C43	5000		CCD-502X	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C44	10000		CCD-103X	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C45	.002	600	CO-H-6202	SI2000	D6-202	CUB6D2	GP2-333-202	PT622	6TM-D2	
C46	330		CCD-331M	SI330	DD-331	G056	811-331	UC-5333	5GA-T33	
C47	.02	400	CO-H-4203	BPD-02	DF-203	CUB4S2	817-02	PT412	4TM-S2	
C48A	2000							DC-522		
B	5000		♦PC2435	♦PA-110	♦PC-100	♦115TM1	♦1405-01	DC-525	♦V-1	
C	5000							DC-525		
C49	.0047	600	CO-O-6472K	1464-0047		IR5D47		MCB465	MS-247	

CAPACITORS (cont)

ITEM No.	RATING CAP	RATING VOLT	OLYMPIC PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
			REPLACEMENT DATA							
C50	.047	400	CO-H-4473	BPD-05	DF-503	CUB4847		PT4147	4TM-547	
C51	1	400	CO-H-4104	P488N-1	DF-104	CUB4P1		PT401	4TM-P1	
C53	01	1000	CO-H-4103	P1088N-01	DD16-103	CUB1S81		PT161	10TM-S1	
C53	02	400	CO-H-4203	BPD-02	DF-203	CUB4S2	617-02	PT412	4TM-S3	Note 7
C54	.047	400	CO-H-4473	BPD-05	DF-503	CUB4S47		PT4147	4TM-547	
C55	47	500	RCM20C470K	NPO-S147	TC2-47	SR5S47	NPO-338-4470	MC3225	MS-447	
C56	05	400	CO-H-4473	BPD-05	DF-503	CUB4S5		PT415	4TM-S5	
C57	05	400	CO-H-4473	BPD-05	DF-503	CUB4S5		PT415	4TM-S5	
C58	02	400	CO-H-4023	BPD-02	DF-203	CUB4S2	617-02	PT412	4TM-S3	
C59	1	200	CO-H-2474	P288N-5		CUB2P5		PT405	2TM-P5	
C60	120	500		NPO-S120	TC2-120	SR5T12	NPO-333-121		MS-313	Note 3
C61	01	600	CO-H-6103	BPD-01	DD6-103	CUB6G1	GP3-333-103	PT611	6TM-S1	
C62	47	500	RCM20C470K	NPO-S147	TC2-47	SR5T47	NPO-338-470	MC3225	MS-447	
C63	47	500	RCM20C470K	NPO-S147	TC2-47	SR5T47	NPO-338-470	MC3225	MS-447	
C64	001	600	CO-H-6102	BPD-001	DD6-102	CUB6G1	GP3L-102	PT621	6TM-D1	
C65	1	400	CO-H-4104	P488N-1	DF-104	CUB4P1		PT401	4TM-P1	Note 4
C66	680	500	RCM30A681	S1680	D6-681	SW5T68	GP2K-681	UC-5368	1FM-368	Note 5
C67	047	400	CO-H-4703	BPD-05	DF-503	CUB4S47		PT4147	4TM-S47	
C68	.22	200	CO-H-2224	P288N-22		CUB2P22		PT4022	2TM-P22	
C69	47	3000	CCD-H	HYD-30-47	DD30-470	V3T47	3KV-470		30GA-Q47	
C70	100	3000	CCD-360K	HYD-30-100	DD30-101	V3T1	3KV-101		30GA-T1	Note 4
C71	100	3000	CCD-360K	HYD-30-100	DD30-101	V3T1	3KV-101		30GA-T1	Note 6
C72	1	400		P488N-1	DF-104	CUB4P1		PT401	4TM-P1	
C73	01	600		BPD-01	DF-103	CUB6S1	GP3-333-103	PT611	6TM-S1	
C74	02	600		BPD-02	DF-203	CUB6S2		PT613	6TM-S2	Note 4

* Items C48A, C48B, C48C, R81A, R81B and R81C are combined in one unit.
Note 2. Used only in AC and AJ models.
Note 3. Some versions may use a 150MMF unit in this application.
Note 4. Not used in some versions.
Note 5. Some versions may use a .001MFD unit in this application.
Note 6. Some versions may use a 5MMFD unit in this application.
Note 7. Some versions may use a 320MMF unit in this application.

CONTROLS

ITEM No.	RATING RESIST. OHMS	RATING WATTS	OLYMPIC PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
			REPLACEMENT DATA					
R1A	1500Ω		PT-2774-1	F1-7	RTV-196	Q7-4047	UF152R	Picture (Panel)
B	1Meg			R2-52			UR6A	Volume Attach to R1A (Rear)
C	Switch			KS-1			US-26	Attach to R1B
R2A	50KΩ	1	PT-2268-1	AB-31	A47-50K-S	Q11-123	U-35	Horizontal Hold-See Note 1
B	Shaft		Not Req.	AK-4	KSS-3	Not Req.	Not Req.	Attach to R2A.
R3A	5000Ω	1	PT-2271-1	AB-10	A47-5000-S	Q11-114	U-14	Vertical Linearity-See Note 2
B	Shaft		Not Req.	AK-4	KSS-3	Not Req.	Not Req.	Attach to R3A.
R4A	1Meg	1	PT-2269-1	AB-69	A47-1Meg-S	Q11-137	U-54	Vertical Hold-See Note 3
B	Shaft		Not Req.	AK-4	KSS-3	Not Req.	Not Req.	Attach to R4A.
R5A	2.5Meg	1	PT-2272-1	AB-83	A47-2.5Meg-S	Q11-219	U-70	Height-See Note 4
B	Shaft		Not Req.	AK-4	KSS-3	Not Req.	Not Req.	Attach to R5A.
R6A	500KΩ	1	PT-2270-1	AB-59	A47400K-S	Q11-133	U-50	Brightness-See Note 5
B	Shaft		Not Req.	AK-4	KSS-3	Not Req.	Not Req.	Attach to R6A.
R7	400Ω	2	PT-95U		39-500			Buzz (Wire Wound)

Note 1. Part No. PT-2268-2 used in early versions.
Note 2. Part No. PT-2271-3 used in early versions.
Note 3. Part No. REB154K-A used in early versions.
Note 4. Part No. PT-2272-2 used in early versions.
Note 5. Part No. PT-2270-2 used in early versions.
+ Universal Resistance (Mallory Exact Duplicate Part No. UE185S)
† Concentrikit Equivalent; K-2 Kit, Base Elements and Shafts; R17-109, P1-109 (Panel)
B13-137, R1-128 (Rear)
76-1 (Switch)

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	OLYMPIC PART No.	IRC PART No.	NOTES
			REPLACEMENT DATA		
R8	47KΩ	1		BTS-47K	Note 6
R9	15KΩ				
R10	330KΩ		REB334K-A	BTS-330K	
R11	220KΩ		REB324K	BTS-220K	
R12	1500Ω			BTS-1500	
R13	10KΩ		REB103K		Note 7
R14	15KΩ				
R15	10KΩ		REB103K		
R16	220KΩ		REB224K		Note 8
R17	1000Ω		REB102M	BTS-1000	
R18	1000Ω		REB102M	BTS-1000	
R19	1000Ω		REB102M	BTS-1000	
R20	3900Ω		REB392K		
R21	330Ω		REB331M	BTS-330	
R22	10KΩ		REB103K		
R23	47Ω		REB470M	BTS-47	
R24	1000Ω		REB102M	BTS-1000	
R25	330Ω		REB331M	BTS-330	
R26	10KΩ		REB103K	BTS-10K	Note 1
R27	47Ω		REB470M	BTS-47	
R28	330Ω		REB331M	BTS-330	
R29	2000Ω		REB202K		
R30	150Ω		REB151M	BTS-150	
R31	5600Ω		REB562K	BTS-5600	
R32	1Meg		REB105M	BTS-1Meg	
R33	5.5Meg		REB155K	BTS-5.5Meg	
R34	1Meg		REB105K	BTS-1Meg	
R35	1500Ω		REB152M	BTS-1500	
R36	33KΩ	2	REB333M	BTS-33K	Note 2
R37	22KΩ		REB223M	BTS-22K	Note 3
R38	2700Ω		REB272M	BTS-2700	Note 1
R39	4700Ω	2	REB472K	BTS-4700	Note 4
R40	150KΩ		REB154M	BTS-150K	
R41	100KΩ		REB104M	BTS-100K	
R42	47KΩ		REB473M	BTS-47K	
R43	1000Ω		REB102M	BTS-1000	
R44	4700Ω		REC472M	BTA-4700	
R45	1000Ω		REB102M	BTS-1000	
R46	330KΩ		REB334K-A	BTS-330K	
R47	150Ω		REB151M	BTS-150	
R48	1Meg		REB105K	BTS-1Meg	Note 5
R49	1Meg		REB105K	BTS-1Meg	
R50	330Ω	2	RED331M	BTS-330	

ITEM No.	RATING OHMS	RATING WATT	OLYMPIC PART No.	IRC PART No.	NOTES
			REPLACEMENT DATA		
R51	470Ω	2	RED471M	BTS-470	
R52	22KΩ		REB223M	BTS-22K	
R53	470KΩ		REB474M	BTS-470K	
R54	2.2Meg		REB225M	BTS-2.2Meg	
R55	82KΩ		REB823K	BTS-82K	
R56	150KΩ		REB154K-A	BTS-150K	Note 9
R57	82KΩ		REB823K	BTS-82K	
R58	22KΩ		REB223K	BTS-22K	
R59	3900Ω		REB392K	BTS-3900	
R60	82KΩ		REB823K	BTS-82K	
R61A	22KΩ			BTS-22K	
B	8200Ω		*PC2435	BTS-8200	
C	8200Ω			BTS-8200	
R62	82KΩ		REB823K	BTS-82K	
R63	1Meg		REB105K	BTS-1Meg	
R64	12KΩ		REB123K	BTS-12K	
R65	5.5Meg		REB155K	BTS-5.5Meg	
R66	150KΩ		REB154K-A	BTS-150K	Note 9
R67	560Ω		REB561K	BTS-560	
R68	2.7Meg		REB275K	BTS-2.7Meg	
R69	1000Ω	2	RED102M	BTS-1000	
R70	5600Ω		REB561K		
R71	560Ω		REB561K		
R72	330KΩ		REB334K-A		
R73	620KΩ		REC624K-A		
R74	320KΩ	5%	REC324J-A		
R75	82KΩ		REB823K		
R76	68KΩ		REC683K-A		
R77	150KΩ		REB154K-A		
R78	82KΩ	5%	REC823J-A		
R79	3900Ω		REB392K		
R80	150KΩ	5%	REC154J-A		
R81	8200Ω		RHB822K		
R82	22KΩ		REC223M		
R83	470KΩ		REB474M		
R84	47Ω		REB470M		
R85	8200Ω		RED823K		
R86	180KΩ		REB184K-A		
R87	100KΩ		REB104K		
R88	150KΩ	5%	REC154K-A		
R89	100KΩ		REB104K		
R90	47KΩ		REB473M		
R91	330KΩ		REB334K-A		Note 8

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS (cont)

ITEM No.	RATING OHMS	RATING WATT	OLYMPIC PART No.	IRC PART No.	NOTES
			REPLACEMENT DATA		
R92	33Ω	1			Note 13
R93	1000Ω	1	REB103K		Note 14
R94	3.3Ω		RES33K1	BW1-3.3	

ITEM No.	RATING OHMS	RATING WATT	OLYMPIC PART No.	IRC PART No.	NOTES
			REPLACEMENT DATA		
R95	200Ω	50	RES649	2D-300	Note 8
R96	100KΩ	1	REC104M	BTA-100K	

Note 1. Some versions use a 22KΩ ½W resistor in this application.
Note 2. A 47KΩ 2W resistor is used in "AJ" and "AK" Models. (Mfgr. Part No. RED473M)
Note 3. Some versions use a 220K ½W resistor in this application. (Mfgr. Part No. REB224K)
Note 4. Some versions use two 2W 10KΩ 5% resistors in parallel.
Note 5. A 820KΩ 1W resistor is used in "AJ" and "AK" Models. (Mfgr. Part No. REB824K)
Note 6. Not used in some versions.
Note 7. Some versions use a 82K ½W resistor in this application. (Mfgr. Part No. REB823K)
Note 8. Some versions use a 3300Ω 1W resistor in this application. (Mfgr. Part No. REB332K)
Note 9. Some versions use a 82000Ω 1W resistor in this application.
Note 10. A 12KΩ 2W resistor is used in "AA" Models. (Mfgr. part #RED123K).
Some versions use a 10KΩ 2W resistor in this application.
Note 11. A 230KΩ 1W resistor is used in "AJ" and "AK" Models. (Mfgr. Part No. REB224K)
Some versions use a 56KΩ 1W resistor in this application. (Mfgr. Part No. REC563K)
Note 12. A 100KΩ 1W resistor is used in "AJ" and "AK" Models. (Mfgr. Part No. REC104K)
Some versions use a 22KΩ 1W resistor in this application. (Mfgr. Part No. REC223M)
Note 13. Some versions use a 56Ω 1W resistor in this application. (Mfgr. Part No. REC560K)
Note 14. Some versions use a 270ΩΩ 1W resistor in this application. (Mfgr. Part No. REB270K)
+ Items C48A, C48B, C48C, R81A, R81B, R81C are combined in one unit.

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	OLYMPIC PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
					REPLACEMENT DATA					
T1	117VAC	610VCT	5VAC	6.3VAC	YR3667	P9999 ⑤	P-2856	P-8538 ①	36R33 ②	R-52BC ③
	1.68A	.240ADC	3A	8.1A	TR3557-④					
					TR3621-⑤					

④ Tape 6.3V ③ 1.6A winding.
⑤ Use HV taps on HV secondary #1, taps other taps and 5V ② 3A winding, parallel and phase 6.3V windings for secondary #3.
Tape 6.3V ③ 1.3A winding, parallel and phase 6.3V ③ 5A windings for secondary #3.
Power transformer used in chassis AA.
Power transformer used in chassis AA, AB, AC, AJ, and AK.
Use low taps on secondary #1 tape other taps. Tape 5V ② 6A, parallel and phase 6.3V ③ 3A windings for Sec. #3.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	OLYMPIC PART No.	Halldorson PART No.	Merit PART No.	RCA TYPE No.	Rom PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
		REPLACEMENT DATA							
T2	Horiz. Output Trans.	TR3599-1 L.O.T.	FB41I*	HVO-1*	225T1*	XO80*	A-8252*	FLY-14*	D-19*
		TR3599-2 ①							
		TR3599 ②							
		TR3587 ③			HVO-32*		A-8254*	FLY-75*	D-49* ④
T3	Vert. Output Trans.	TR3589 or TR3558	Z1900 ③	A-5039 ①	226T1 ②	V3U ③ ⑤	A-8141 ⑤	26854 ⑤	A-104X ⑤
T4A	Yoke(90°)Horiz. (18.5MH)	CL3600 ⑥	DF601 ③	MDF-92	235DJ ③	Y90F19/43 ③	DY-16A	Y-16 ③	Y-41-1
B	Vert. (41MH)								
T4A	Yoke(70°)Horiz.(8MH)	CL3598 ②	DF605 ③	MDF-73 ③	222DI ③	Y70F18/43 ③	DY-11A ②	Y-8 ③	Y-22-1 ③
III	Vert. (39MH)								

① Used in chassis "AB", "AC", "AJ", "AK".
② Used in chassis "AA" only.
③ Use 18 to 1 turns ratio.
④ Drill new mounting hole(s).
⑤ Connect blue lead to plate (pin #1 of VII). Connect red lead of trans. to yellow lead of yoke.
Remove green lead of yoke from ground, & connect it & green lead of trans. to junction of R5, R89, R88, & C4.
⑥ Connect Horiz. damping network across terms #3 & #7. Use original if necessary.
Remove capacitor from terms #1 & #2. Use original horiz. damping network if necessary.

For Part No. TR3599, -1, -2

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type is Listed

ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Rom Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
II	9	9	9	9	9	9	9
8	8	8	8	8	8	8	8
7	8	8	7	7	7	7	7
3	3	3	3	3	3	3	3
1	1	1	1	1	1	1	1
Special Note	⑧	⑧					

⑧ Remove horiz. centering resistor R92 & bypass capacitor C68 from circuit.

For Part No. TR3597

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type is Listed

ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Rom Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
5	5			5	5	5	
4	4			4	4	4	
3	3			3	3	3	
2	2			2	2	4	
1	1			1	1	3	

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	OLYMPIC PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
			REPLACEMENT DATA						
T5	2.4KΩ	3.5Ω	TR2765-1	21101	A-3025	A-3332	26S58 ⑤	S-12X ⑤	⑤ Drill one new mtg. hole.

SPEAKER

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V. C. IMP.	OLYMPIC PART No.	OUAM PART No.	NOTES
				REPLACEMENT DATA		
SP1	5"	PM	3.5Ω	SK-1788-2 ⑤	5A07	⑤ Used in Models 17TA19, 17TA19BX, 17TA32, 17TA33, 21TB34, 21TB40, 21TC54, 21DB101, 21DB120, 21DB131, 21DC100, 21DC101, 22DC120, 22DC121, and 22C835.
	5"	PM	14.7Ω	SK3147 ②	5A15T	
	8"	PM	3.1Ω	SK3149 ②	RA823.2	
	8"	PM	3.1Ω	SK1905 ③	8A21	⑥ Tweeter and woofer used in Models 21KB36, 21KB36, 21KB79, 21KC46, and 21KC56.
	8"	PM	3.1Ω	SK3891 ④	8A21	⑦ Used in Models 21DB34, and 21KC44.
	10"	PM	3.5Ω	SK1769-1 ⑤	10A31	⑧ Used in Models 21CB35, 21DB71, 21CC55, 21CC70, 21DC71, 24C768, 24C788BE, 24C788MK, and 24C877.
						⑨ Used in Models 22DB16 , 22DB23, 22DB133, 22DB134, 22DC116, 22DC122, 22DC123, and 22DC124

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI	DC RES. SEC	OLYMPIC PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
				REPLACEMENT DATA				
L1	Ant. Coils	0ΩCT	0Ω					
L2	Fil. Choke	0Ω						
L3	Neut. Coil	0Ω						
L4	RF Mixer Grid, Osc.Coils	0Ω						
L5	Fil. Choke	0Ω						
L6	RF Coil	0Ω						
L7	Conv. Plate	.8Ω	.1Ω					
L8	Accompanying Sound Trap	0Ω		CL3972		20-1021	*TV-112*	6171*
L9	1st Video IF	0Ω	0Ω	CL3966		17-1063		6249
L10	2nd Video IF	.1Ω	.1Ω	CL3715		17-1063		6249
L11	3rd Video IF	.1Ω	.1Ω	CL3715		17-1064		6250
L12	Adj. Sound Trap	0Ω		CL3972		20-1006		6171A
L13	4th Video IF	.1Ω	.1Ω	CL3309		17-1063		6249
L14	Series Peaking Coil	2.5Ω		CL1535		19-3036	*TV-180*	6176
L15	Series Peaking Coil	5.5Ω		CL3401		19-3075m	*TV-181m*	6173m
L16	Shunt Peaking Coil	11.5Ω		CL3403		19-3300a	*TV-190a*	6165a
L17A	4.5MC Trap	2.1Ω		TR3366				
B	Sound IF	2.1Ω						
L18	Series Peaking Coil	10.5Ω		CL3398		19-3250+	*TV-165+*	6161+
L19	Shunt Peaking Coil	11.5Ω		CL3403		19-3300a	*TV-190a*	6165a
L20	RF Coil	4.3Ω		CL3401		19-3075m	*TV-181m*	6173m
L21	RF Choke	11.6Ω		CL3403		19-3300a	*TV-190a*	6165a
L22	Quadrature Coil	9.5Ω		CL3603-1		17-3495a	*TV-113a*	1481

* Enlarge mounting hole.
■ Parallel with 22KΩ resistor.
▲ Parallel with 1Meg resistor.
+ Parallel with 15KΩ resistor.
a Use one winding only.

TRANSFORMER (HORIZ. OSC.)

ITEM No.	DC RES. PRI.	DC RES. SEC.	OLYMPIC PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	RCA TYPE No.	Rom PART No.	Thordarson PART No.	Triad PART No.	NOTES
			REPLACEMENT DATA								
L23	22Ω	56Ω	TR2284	30-14027	TV-162†	61831	205H11		HS-31		Waveform Winding 45Ω

† Reverse coil mounting in can.

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	RATINGS D. C. RESISTANCE	RATINGS INDUCTANCE @ CURRENT 1000 ^(A)	OLYMPIC PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
				REPLACEMENT DATA					
L24	.200ADC	64Ω	21HY	CK3346 ①	C5018 ②	C-2891 ②	C-2325 ②	26C43 ③	C-21X

① Filter choke used in chassis AJ and AK.
② Drill one new mounting hole.

FUSES

ITEM No.	TYPE	RATING	OLYMPIC PART No. FUSE	OLYMPIC PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
			REPLACEMENT DATA					
M1	3AG	3/8A 250V	FU3492*	FH3852	312.375 (3AG 3/8A)	357001	AGC 3/8	4405

* Alternate Part No. FU3958.

CRYSTAL DIODES

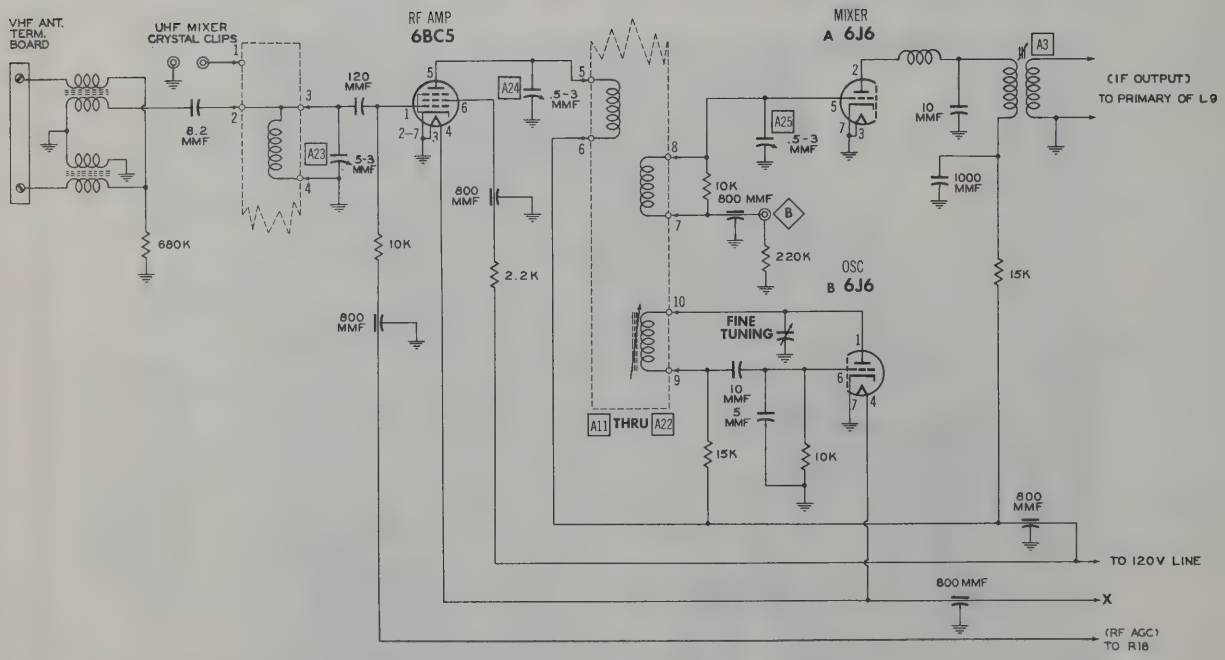
ITEM No.	ORIG. TYPE	OLYMPIC PART No.	SYLVANIA PART No.	NOTES
		REPLACEMENT DATA		
M2	1N80*	1N80†	1N60	Video Det.

* Some versions may use type 1N64 crystal diode in this application.
† Alternate Part #1N64 used in some versions.

PARTS LIST AND DESCRIPTIONS (Continued)

MISCELLANEOUS

ITEM No.	PART NAME	OLYMPIC PART No.	NOTES
M3	Tuner	CL3815	Chassis AC, AJ (Q Series)
	Tuner	CL3963	Chassis AC, AJ (TC Series)
	Tuner	CL3595	Chassis AA, AB, AK (H Series)
	Tuner	CL3998	Chassis AA, AB, AK (TA Series)
M4	Centering Device	PP2763	
M5	Ion Trap	PP2248	Chassis AB, AC, AJ, AK
	Ion Trap	PP2623	Chassis AA
B3	Trimmer Cap.	CT3526	Horiz. Drive (110-580MMF)
	Cabinet	CA3248-3	Model 17TA19BX
	Cabinet	CA3308-3	Models 22DB101, 22DB120, 22DB121
	Cabinet	CA3315	Model 22DB166
	Cabinet	CA3485	Model 17CA20X
	Cabinet	CA3570	Model 21CB41
	Cabinet	CA3580	Model 21KB26
	Cabinet	CA3650	Model 17TA32
	Cabinet	CA3650-1	Model 17TA33
	Cabinet	CA3655	Models 21TB34, 21TB40
	Cabinet	CA3686	Model 21CB35
	Cabinet	CA3700	Model 21KB36
	Cabinet	CA3705	Models 22DB122, 22DB123, 22DB124
	Knob	KN2295-1	Channel Selector-Mahogany
	Knob	KN2295-2	Channel Selector- Gold
	Knob	KN2545	Channel Selector-Tan
	Knob	KN2296	Fine Tuning-Mahogany
	Knob	KN2296-1	Fine Tuning- Gold
	Knob	KN2546	Fine Tuning-Tan
	Knob	KN2297-1	On-off-volume-Mahogany
	Knob	KN2297-2	On-off-volume-Gold
	Knob	KN2547	On-off-volume-Tan
	Knob	KN2298	Contrast-Mahogany
	Knob	KN2298-1	Contrast-Gold
	Knob	KN2548	Contrast-Tan
	Safety Glass	PP3636	Models 22DB116, 22DB101, 22DB120, 22DB121
	Safety Glass	PP3572	Models 21KB24, 21KB26, 21KB36
	Safety Glass	PP3648	Models 17TA32, 17TA33
	Safety Glass	PP3656	Models 22DB122, 22DB123, 22DB124
	Safety Glass	PP3656-1	Models 21TB34, 21TB40, 21CB35, 21CB41
	Mask	PP3568-1	Models 21KB24, 21KB26, 21KB36
	Mask	PP3568-2	Blonde, Models 21KB24, 21KB26
	Mask	PP3637	Models 22DB116, 22DB101, 22DB120, 22DB121
	Mask	PP3646-1	Models 22DB122, 22DB123, 22DB124
	Mask	PP3646-2	Models 21TB34, 21TB40, 21CB35, 21CB41
	Mask	PP3647	Models 17TA32, 17TA33


VHF ANT. TERM. BOARD
UHF MIXER CRYSTAL CLIPS
RF AMP 6BC5
MIXER A 6J6
OSC B 6J6
FINE TUNING
A11 THRU A22
(IF OUTPUT) TO PRIMARY OF L9
TO 120V LINE
800 MMF
X
(RF AGC) TO R18
VHF TUNER PART NO. CL3998 USED WITH CHASSIS AA, AB, AND AK (TA SERIES)

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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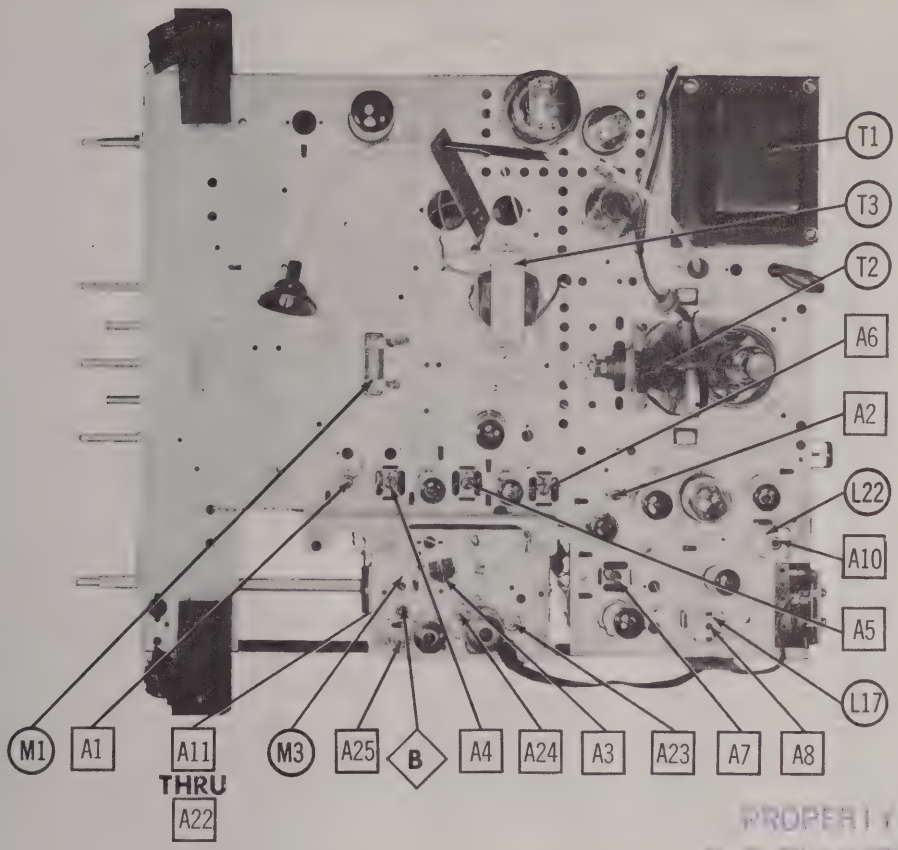
ALTERNATE TUNER SCHEMATIC



CHASSIS TOP VIEW

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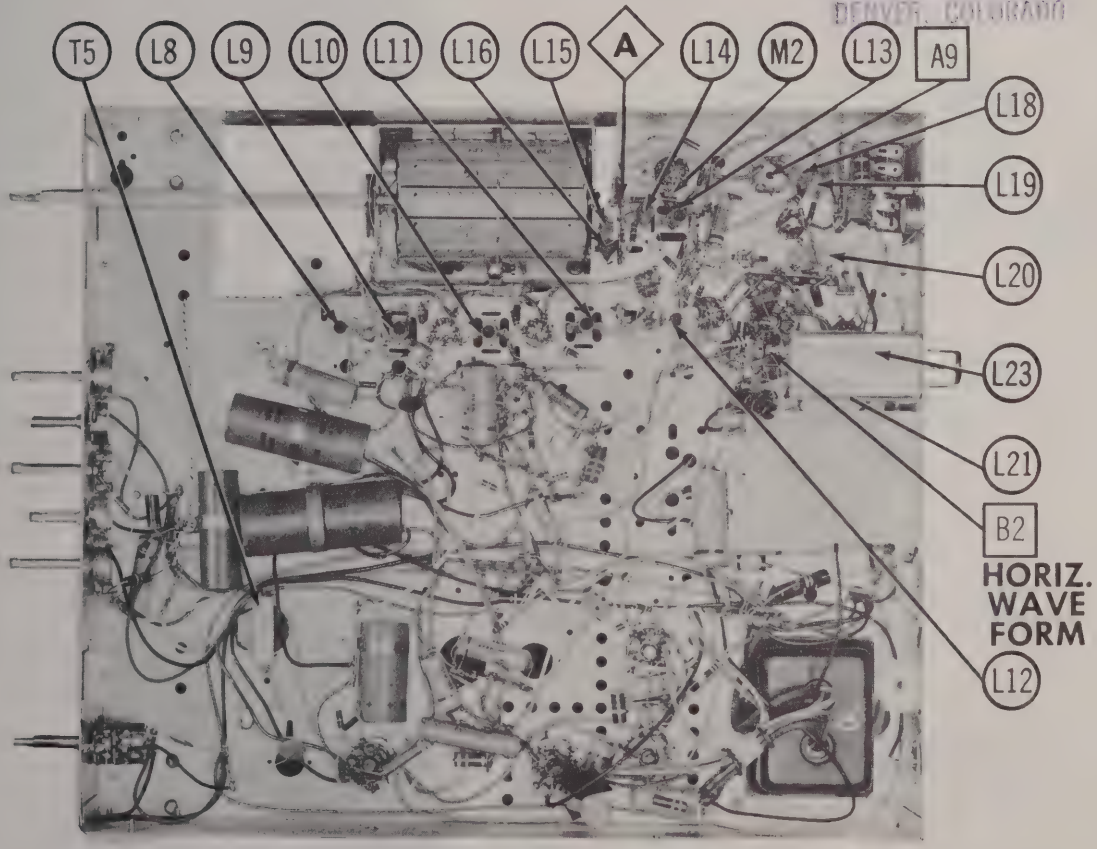
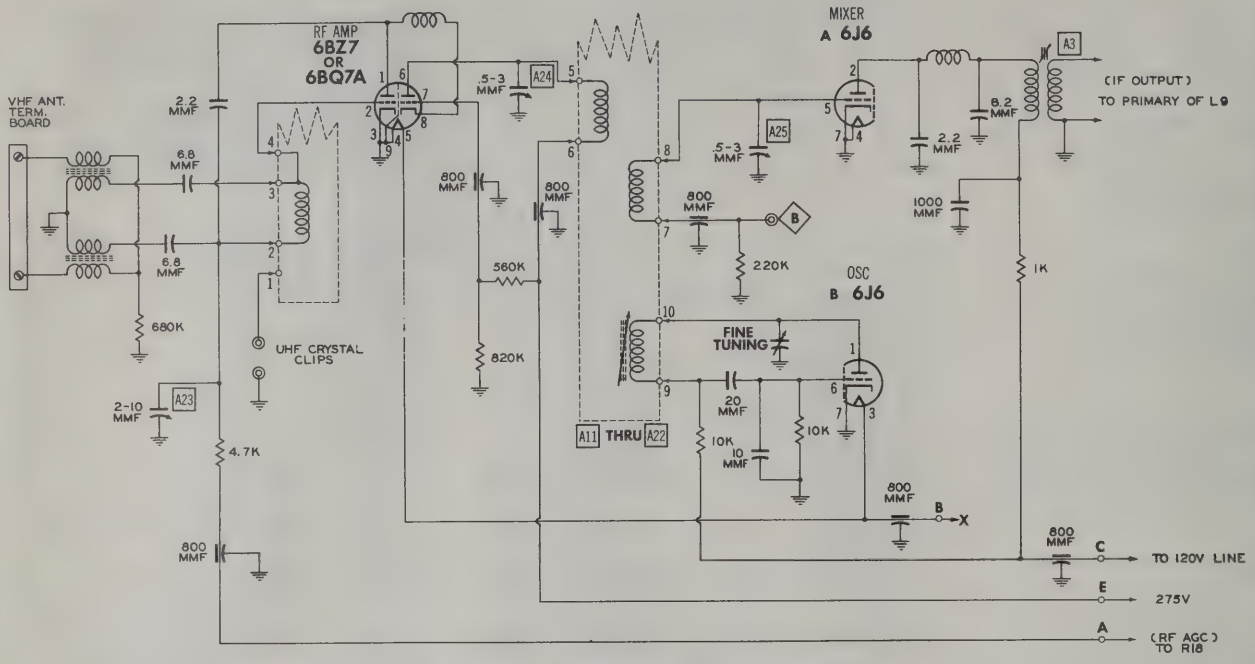


CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENT.



VHF TUNER PART NO. CL 3963 USED WITH CHASSIS AC, AND AJ (TC SERIES)

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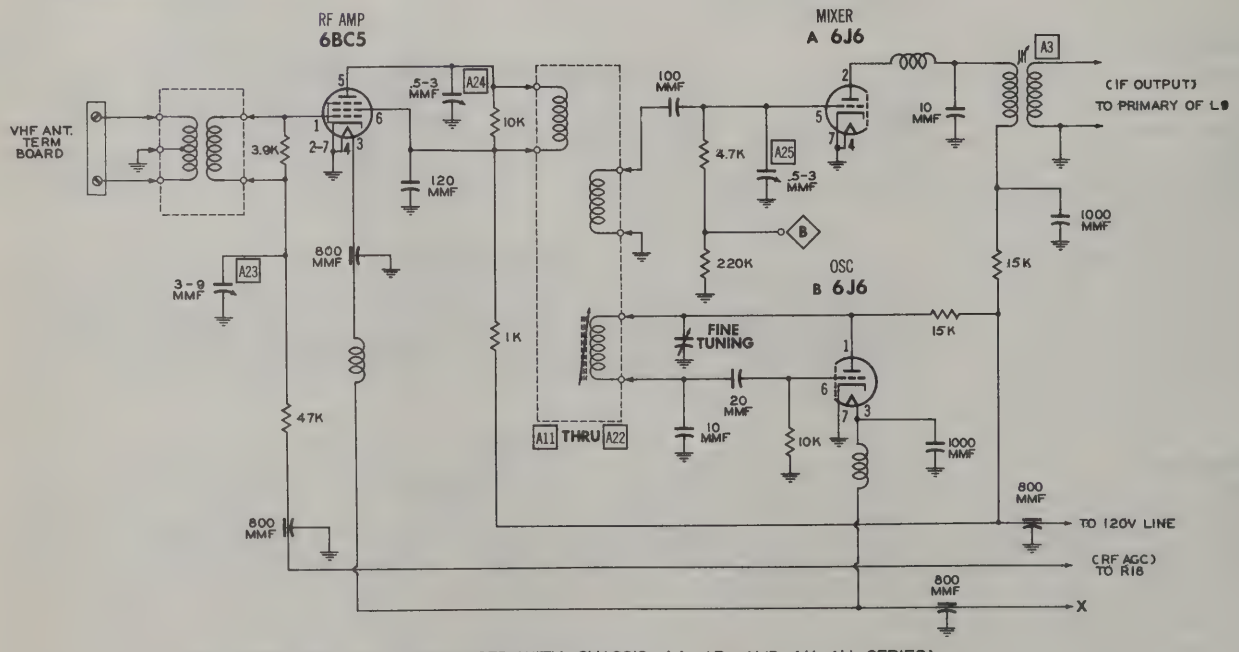
ALTERNATE TUNER SCHEMATIC



VHF TUNER PART NO. CL 3595 USED WITH CHASSIS AA, AB, AND AK (H SERIES)

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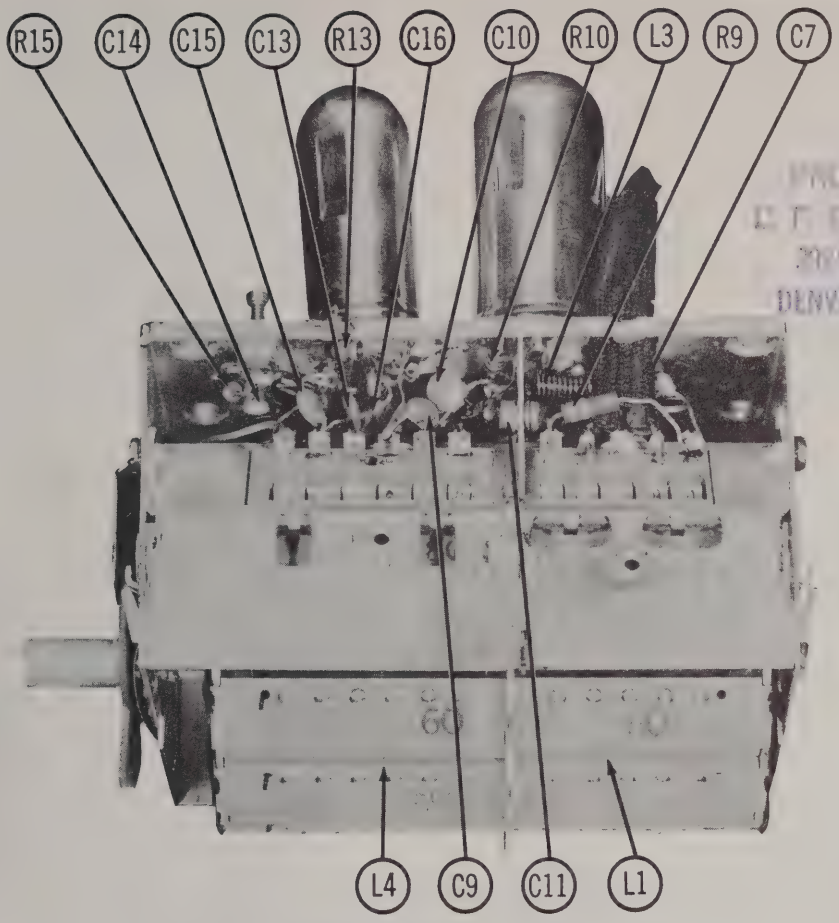
ALTERNATE TUNER SCHEMATIC



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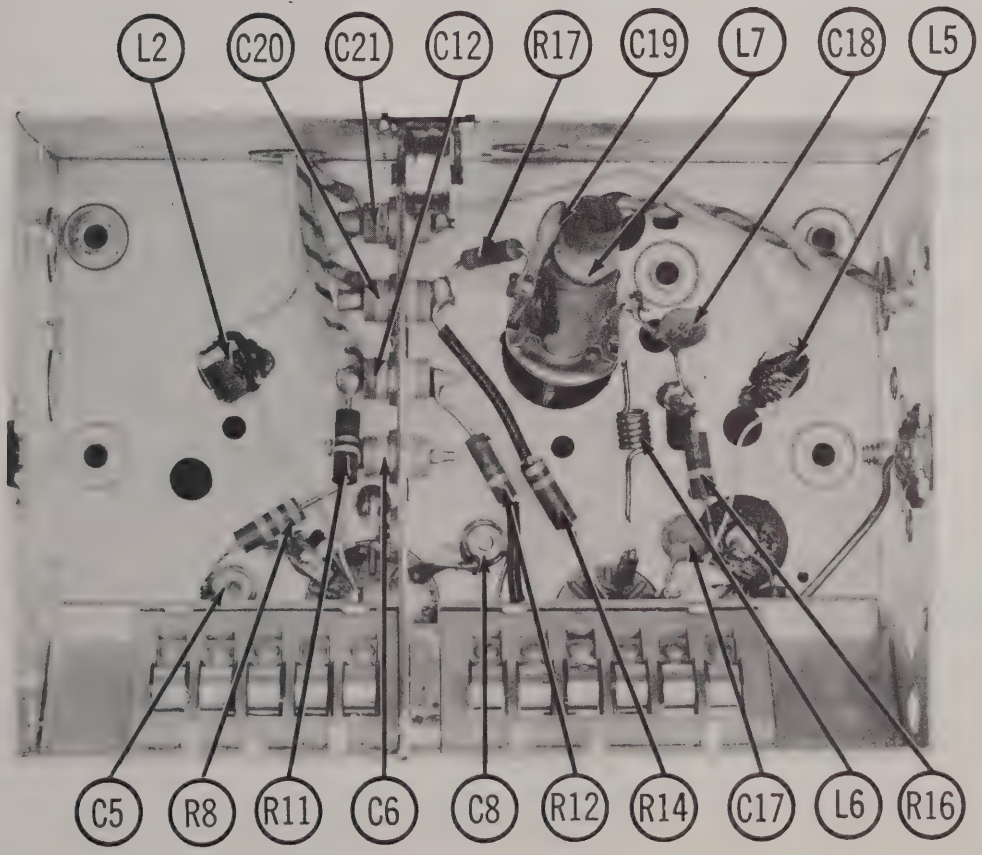
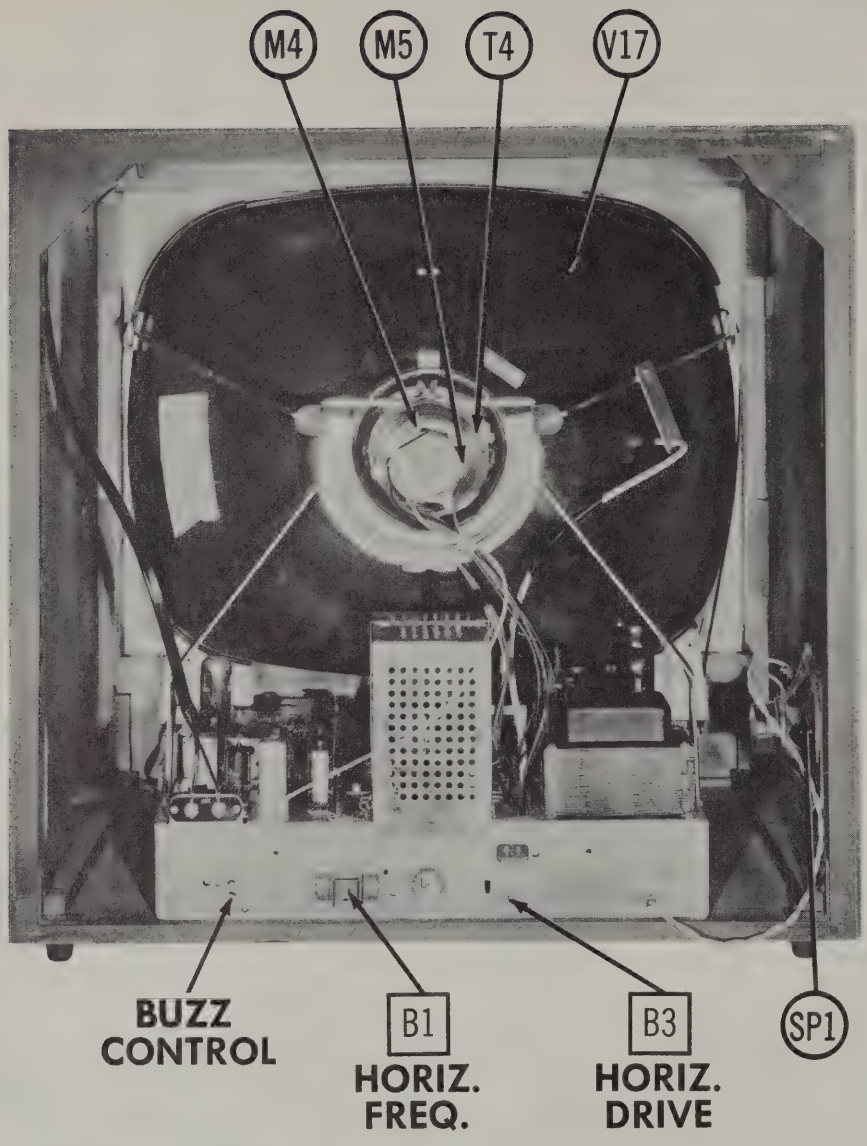
RF TUNER-RIGHT SIDE



RF TUNER-BOTTOM VIEW



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern.

Connect a short jumper across terminals "C" and "D" of the horizontal oscillator coil (L23).

Set the horizontal hold control fully clockwise. Adjust the horizontal frequency slug (B1) until the picture falls into sync. Remove the jumper from terminals "C" and "D" of L23. Connect the high side of vertical amplifier of scope thru a 5MMF to terminal "C" of L23. Low side to chassis.

Adjust the horizontal waveform slug (B2) for a waveform similar to Fig. 7, with broad and narrow peaks of equal height.

If necessary, during adjustment of B2, keep picture in sync with horizontal hold control or B1.

Remove scope and retouch B1 for the following conditions:

1. At full clockwise position of horizontal hold control a blanking bar or picture jitter should be evident.

2. At full counter clockwise position of horizontal hold control, picture should lose sync with $4\frac{1}{2}$ to 5 diagonal bars sloping downward to the left. If picture remains in sync at either extreme setting of horizontal hold control switch off channel and back again so that picture falls out of sync.

Adjust the horizontal drive trimmer (B3) counter clockwise as far as possible without the presence of vertical white lines or compression near the center of the picture. If neither of these indications appear adjust B3 for a picture slightly wider than necessary to fill the picture mask horizontally.

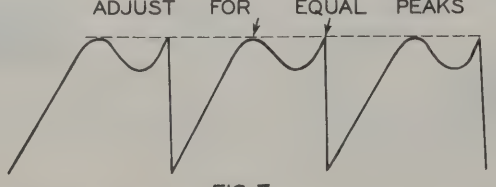


FIG. 7

SILVERTONE MODELS 4250, 42501, 42502 (Ch. 137.91900)

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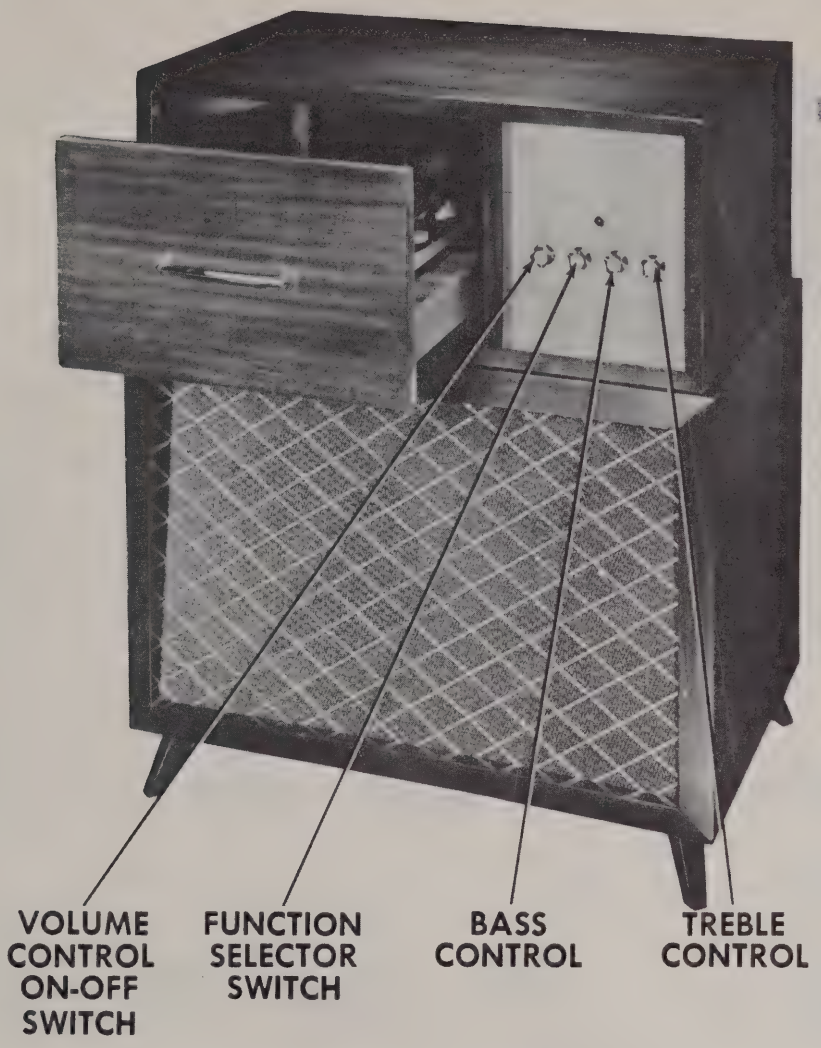

SILVERTONE MODELS 4250, 42501, 42502 (Ch. 137.91900)

TRADE NAME	Silvertone Models 4250, 42501, 42502 (KIT) (Ch. 137.91900)
SUPPLIER	Sears Roebuck & Co., 925 S. Homan Ave., Chicago, Illinois
TYPE SET	AC Operated Phono Amplifier With 3 Speed Automatic Record Changer
TUBES (Five)	Types: 12AX7 AF Amp., 12AX7 AF Amp.-Phase Inv., (2) 6V6GT Output, 5Y3GT Rectifier
POWER SUPPLY	110-120 Volts AC-60 Cycles RATING .5 Amp. @ 117 Volts AC

FOR SERVICE INFORMATION ON RECORD CHANGER UNIT - SILVERTONE MODEL 488.216-12, SEE SIMILAR V-M MODEL 950 PHOTOFACT SET #216 - FOLDER 11 OR RECORD CHANGER MANUAL CM-5.

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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PARTS LIST AND DESCRIPTIONS

SILVERTONE
Model 4250

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		SILVERTONE PART No.	STANDARD REPLACEMENT		
V1	AF Amplifier	12AX7	12AX7	9A	
V2	AF Amplifier-Phase Inverter	12AX7	12AX7	9A	
V3	Audio Output	6V6GT	6V6GT	7S	
V4	Audio Output	6V6GT	6V6GT	7S	
V5	Rectifier	5Y3GT	5Y3GT	5T	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP	VOLT.	SILVERTONE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	▲30	450	C11530	AFH3-37	CO28	FP444.4	TM-4050	Q-045	TVL-4766
B	■15	450							
C	▲15	450							
C2A	▲20	450	C11529	AFH3-138	CO97	FP366	TM-3085	Q-060	TVL-3751
B	■10	450							
C	▲50	50							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	SILVERTONE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C3	470		C11546	BPD-00047	DD-471	K060	811-471	UC-5347	5GA-T47	
C4	47		C11148	SI47	D6-470	TP29	GP1K-470	UC-5447	5GA-Q47	
C5	47		C11148	SI47	D6-470	TP29	GP1K-470	UC-5447	5GA-Q47	
C6A	200		♦							
B	100									
C	4500									
D	4500									
C7	470		C11546	BPD-00047	DD-471	K060	811-471	UC-5347	5GA-T47	
C8	.06	400	C11557	P488N-06		CUB6S6		PT616	6TM-S6	
C9	.06	400	C11557	P488N-06		CUB6S6		PT616	6TM-S6	
C10	.002	400	C11559	SI2000	D6-202	CUB6D2	GP2-333-202	PT622	6TM-D2	
C11	.02	400	C11558	BPD-02	DF-203	CUB4S2	817-02	PT412	4TM-S2	
C12	.02	400	C11558	BPD-02	DF-203	CUB4S2	817-02	PT412	4TM-S2	
C13	.002	400	C11559	SI2000	D6-202	CUB6D2	GP2-333-202	PT622	6TM-D2	
C14	.05	400	C11560	BPD-05	DF-503	CUB4S2		PT415	4TM-S5	
C15	.005	400	C11545	BPD-005	D6-502	CUB6D5	GP2-333-502	PT625	6TM-D5	
C16	.082	400								Note 1
C17	.06	400	C11557	P488N-06		CUB6S6		PT616	6TM-S6	
C18	.06	400	C11557	P488N-06		CUB6S6		PT616	6TM-S6	
C19	.06	400	C11557	P488N-06		CUB6S6		PT616	6TM-S6	
C20	.01	400	C11561	BPD-01	D6-103	CUB4S1	GP3-333-103	PT411	4TM-S1	
C21	.002	400	C11559	SI2000	D6-202	CUB6D2	GP2-333-203	PT622	6TM-D2	
C22	.002	400	C11559	SI2000	D6-202	CUB6D2	GP2-333-203	PT622	6TM-D2	

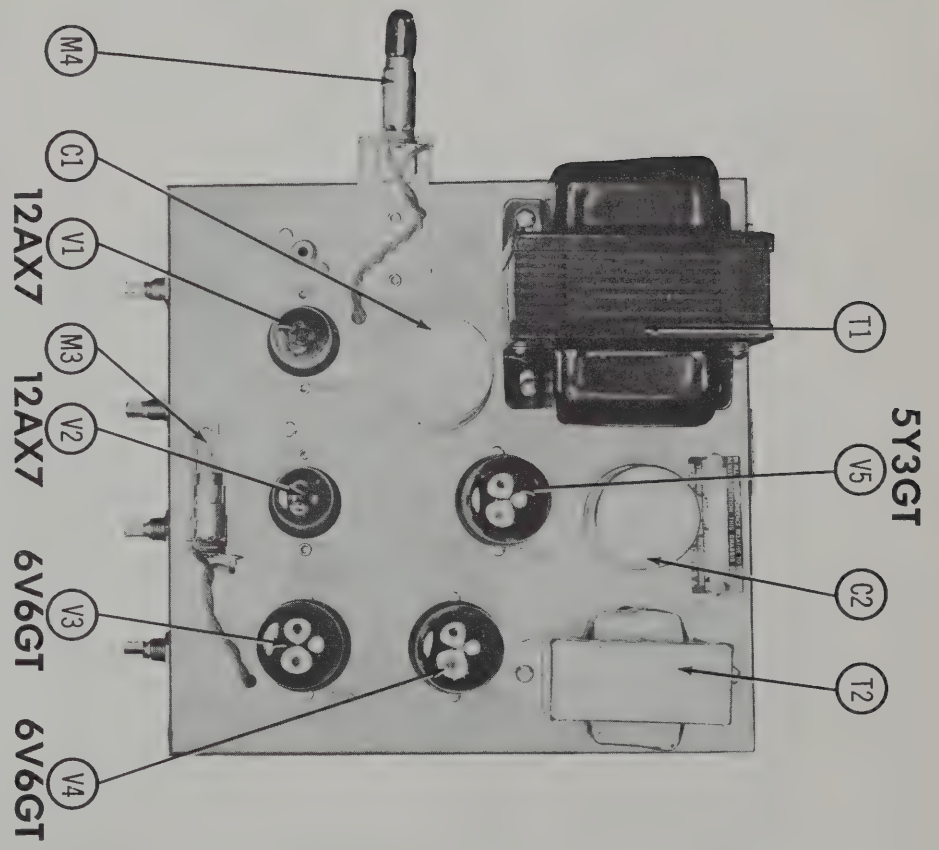
♦ Volume control includes C6A, C6B, C6C, C6D, R8A and R8B.
Note 1. Some versions may use a .06MFD capacitor (part #C11557) in this application.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	SILVERTONE PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1	500KΩ	½	C11544	C1-60-S				Volume & switch - tap ⓐ 200KΩ & 300KΩ - Note 1
R2A	500KΩ	½	C11547	BSK-60	A47-500K-Z	Q13-133	U-48	Bass
B	Shaft		Not Req.	Not Req.	KSS-3	Not Req.	Not Req.	Attach to R2A
R3A	500KΩ	½	C11547	BSK-60	A47-500K-Z	Q13-133	U-48	Treble
B	Shaft		Not Req.	Not Req.	KSS-3	Not Req.	Not Req.	Attach to R3A

Note 1. Volume control includes C6A, C6B, C6C, C6D, R8A and R8B.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA SILVERTONE PART No.	REPLACEMENT DATA IRC PART No.	NOTES
R4	220KΩ	1/2	C9513	BTS-220K	
R5	100KΩ	1/2	C8975	BTS-100K	
R6	100KΩ	1/2	C8975	BTS-100K	
R7	100KΩ	1/2	C8975	BTS-100K	
R8A	50KΩ	1/2		BTS-47K	
B	50KΩ	1/2		BTS-47K	
R9	6800Ω 5%	1/2	C11582	BTS-6800 5%	
R10	1.2Meg	1/2	C9895	BTS-1.2Meg	
R11	270KΩ	1/2	C8841	BTS-270K	
R12	1.2Meg	1/2	C9895	BTS-1.2Meg	
R13	2200Ω	1/2	C10986	BTS-2200	
R14	270KΩ	1/2	C8841	BTS-270K	
R15	27KΩ	1/2	C8973	BTS-27K	
R16	150KΩ	1/2	C10303	BTS-150K	
R17	10KΩ	1/2	C11144	BTS-10K	
R18	47KΩ	1/2	C11539	BTS-47K	
R19	560KΩ	1/2	C8842	BTS-560K	
R20	27KΩ 5%	1/2		BTS-27K 5%	Note 1
R21	2700Ω	1/2	C10899	BTS-2700	
R22	270KΩ	1/2	C8841	BTS-270K	
R23	47KΩ	1/2	C11539	BTS-47K	
R24	1.2Meg	1/2	C9895	BTS-1.2Meg	
R25	2200Ω	1/2	C10986	BTS-2200	
R26	47KΩ	1/2	C11539	BTS-47K	
R27	47KΩ	1/2	C11539	BTS-47K	
R28	4700Ω	1/2	C10429	BTS-4700	
R29	470KΩ	1/2	C10305	BTS-470K	
R30	300Ω	2	C11541		
R31	470KΩ	1/2	C10305	BTS-470K	
R32	1000Ω	1/2	C11543	BTS-1000	
R33	1500	10	C11542	PW10-1500	

Note 1. Some versions use a 33KΩ resistor in this application.
♦ Items R8A, R8B, C6A, C6B, C6C and C6D are included in the volume control (in one unit).

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	REPLACEMENT DATA SILVERTONE PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC @.55A	650VCT .06lADC	5VAC @ 2A	6.3VCT @1.84A	C11454	P9306 ①	P-3151 ①	PC-8409①	24R02U ①	R-11A ①

① Drill new mounting holes.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA SILVERTONE PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T2	6KΩ CT	3.15Ω	C11455	Z1007 ①	A-2901	A-3830	22S58	S-55X	① Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V. C. IMP.	REPLACEMENT DATA SILVERTONE PART No.	REPLACEMENT DATA QUAM PART No.	NOTES
SP1	5 1/4"	PM	3Ω	C10901	52A1	
SP2	5 1/4"	PM	3Ω	C10901	52A1	
SP3	12"	PM	6.7Ω	C11537	12A6	

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA SILVERTONE PART No.	ASTATIC PART No. CARTRIDGE	ASTATIC PART No. NEEDLE	ELECTRO-VOICE PART No. CARTRIDGE	ELECTRO-VOICE PART No. NEEDLE	REMARKS
M1	C11406	55-T	GD-J	47	0-1 or S-1 & 0-3	

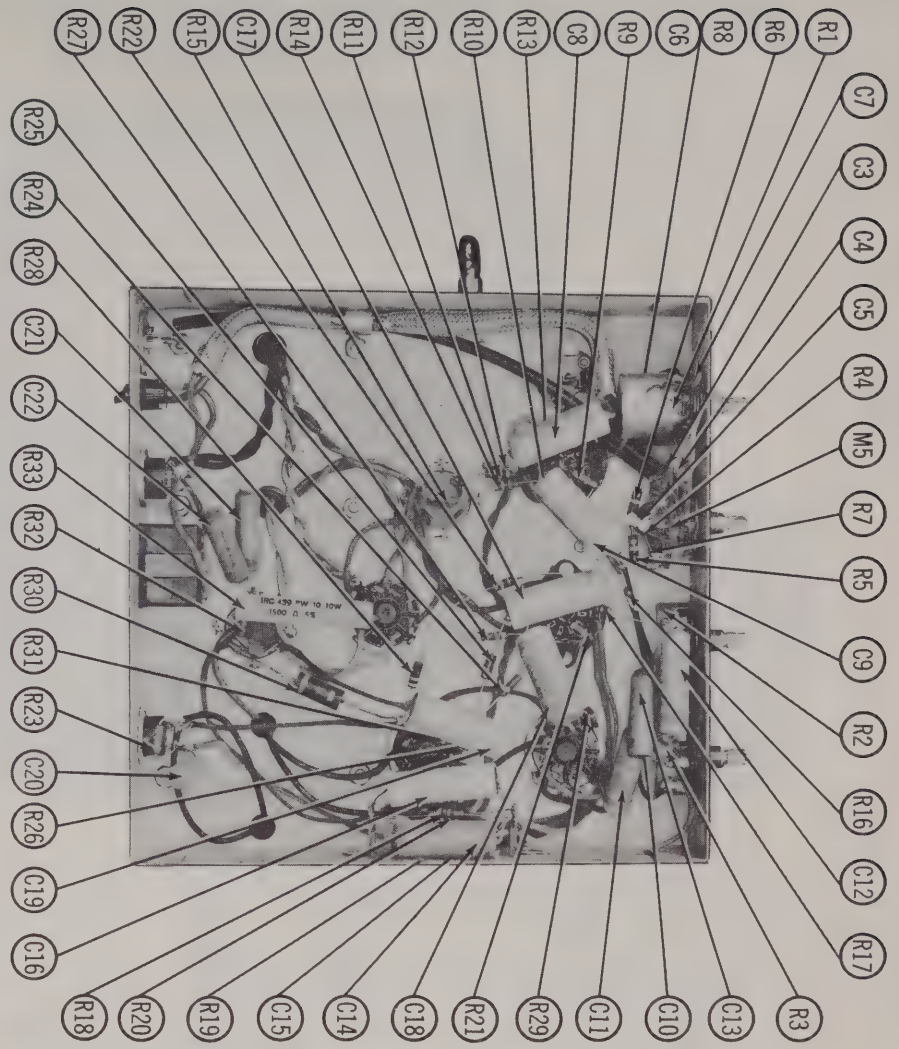
ASTATIC AND ELECTRO-VOICE NEEDLE LISTINGS SHOWN ABOVE ARE SPECIFIED FOR THE RESPECTIVE REPLACEMENT CARTRIDGES LISTED. FOR ORIGINAL CARTRIDGE NEEDLE REPLACEMENTS SEE BELOW.

PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

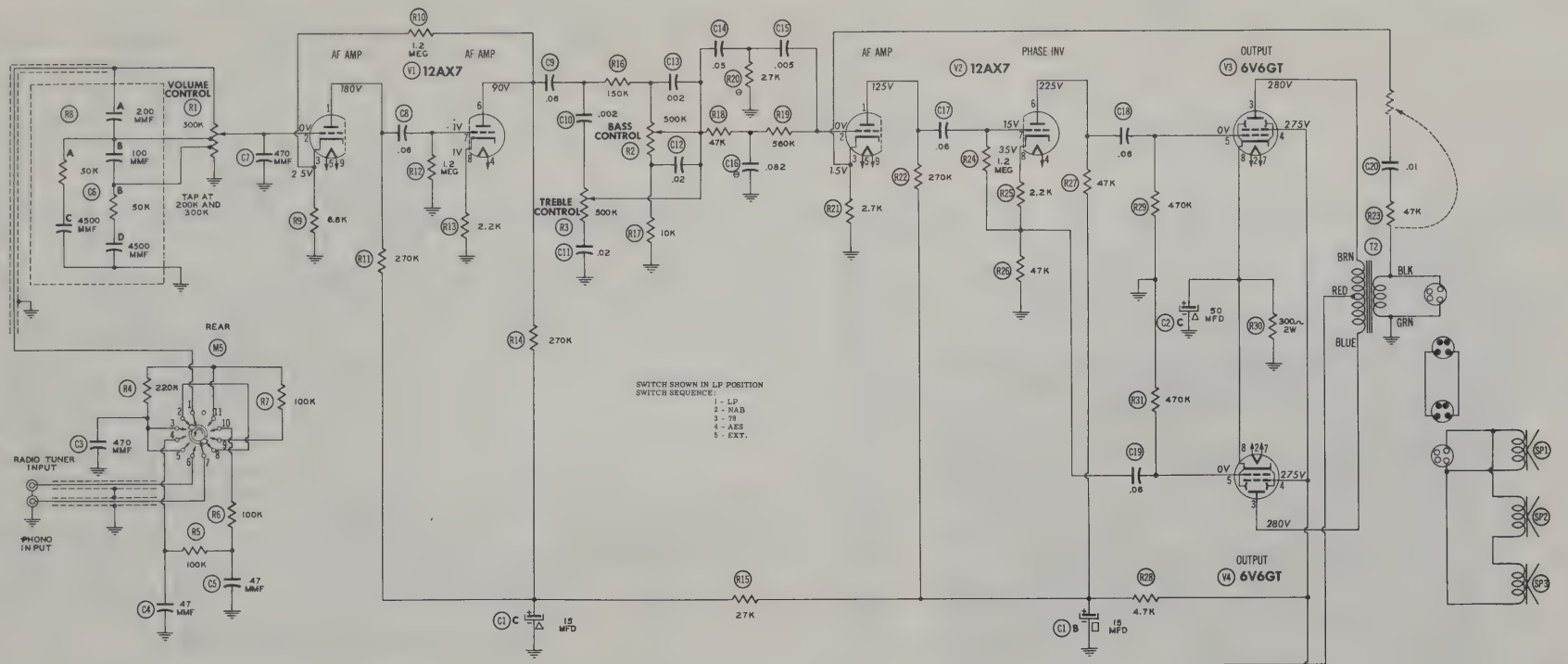
ITEM No.	REPLACEMENT DATA SILVERTONE PART No.	JENSEN PART No.	PERMO PART No.	WALCO PART No.	REMARKS
M2	C11407	*S-67 or †S-66 or ♦†S-66SD or ♦S-66D	†AC-434 or ♦†AC-434D1 or †♦AC-434D2 or ♦AC-434D	†W-75TPS or ♦†W-75DS or ♦W-75TPD	* Metal † Jewel ♦ Diamond

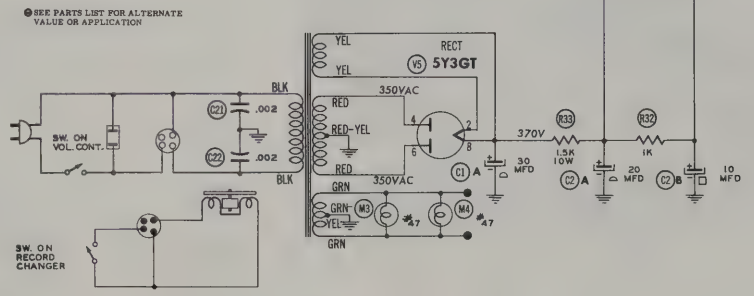
CHASSIS—BOTTOM VIEW



MISCELLANEOUS

ITEM No.	PART NAME	SILVERTONE PART No.	NOTES
M3	Pilot Light		#47
M4	Pilot Light		#47
M5	Switch	C11555	Selector & phono compensation (Rotary-wafer type)
	Case	C4250	Mahogany
	Case	C42501	Limed oak
	Knob	C11575	Control - 4 used





RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	12AX7	†304KΩ	0Ω	6.8KΩ	.1Ω	.1Ω	†304KΩ	1.2Meg	2.2KΩ	.1Ω
V 2	12AX7	†277KΩ	627KΩ	2.7KΩ	.1Ω	.1Ω	†54KΩ	1.2Meg	47KΩ	.1Ω
V 3	6V6GT	TP	.1Ω	†1.8KΩ	†2.6KΩ	470KΩ	NC	.1Ω	300Ω	
V 4	6V6GT	TP	.1Ω	†1.8KΩ	†2.6KΩ	470KΩ	TP	.1Ω	300Ω	
V 5	5Y3GT	NC	50KΩ	NC	95Ω	NC	89Ω	TP	50KΩ	

† MEASURED FROM PIN 8 OF V5.
TP - TIE POINT
NC - NO CONNECTION

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

THE COOPERATION OF THE MANUFACTURER OF THIS EQUIPMENT MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

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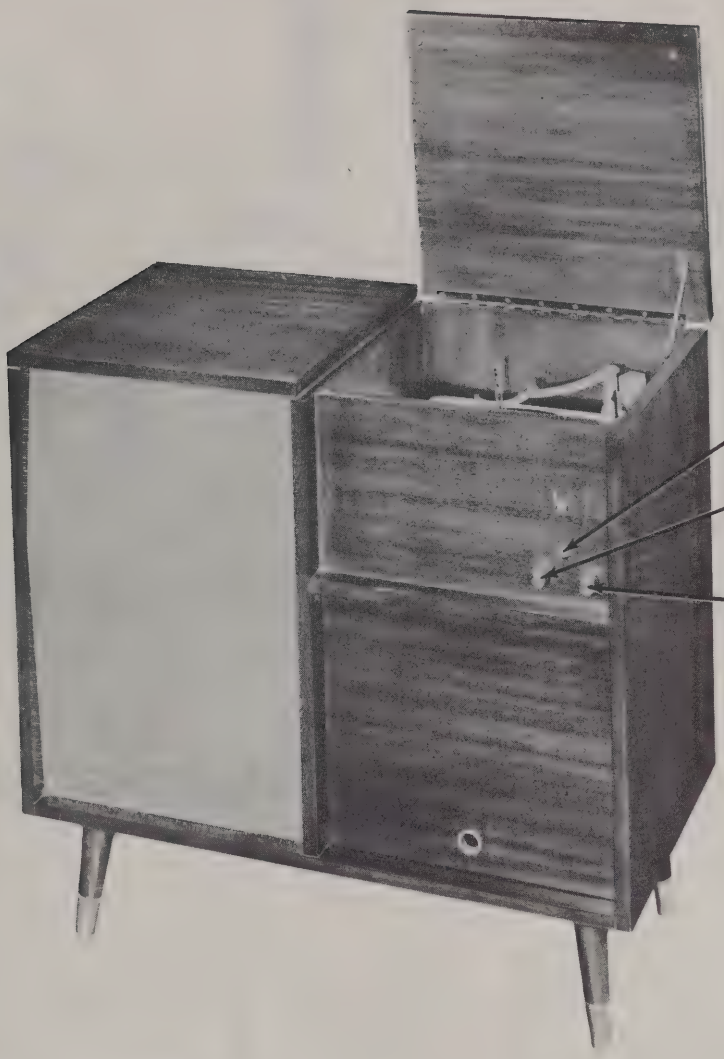

V-M
MODEL 565

TRADE NAME	V-M Model 565
MANUFACTURER	V-M Corp., Benton Harbor, Michigan
TYPE SET	AC Operated Phono Amplifier with 4 Speed Automatic Record Changer
TUBES (Four)	Types: 12AX7 AF Amp. -Phase Inv., (2) 6V6GT Output, 5Y3GT Rectifier
POWER SUPPLY	110-120 Volts AC-60 Cycles
RATING	.46 Amp. @ 117 Volts AC

FOR SERVICE INFORMATION ON RECORD CHANGER UNIT-V-M MODEL 1200-SEE PHOTOFACT SET #290-FOLDER #11.

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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PARTS LIST AND DESCRIPTIONS

V-M Model 565

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: V-M PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	AF Amp. Phase Inv.	12AX7	12AX7	9A	
V2	Audio Output	6V6GT	6V6GT	7AC	
V3	Audio Output	6V6GT	6V6GT	7AC	
V4	Rect.	5Y3GT	5Y3GT	5T	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING: CAP.	RATING: VOLT.	REPLACEMENT DATA: V-M PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	■20	450	12011	AFH4-14	D013	FP444	TM-Q20-450	Q-040	TVL-4763
B	▲20	450							
C	20	450							
D	▬20	450							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: V-M PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C2	.047	400	12009	BPD-05	DF-503	CUB4S47		PT4147	4TM-S47	
C3	.047	400	12009	BPD-05	DF-503	CUB4S47		PT4147	4TM-S47	
C4	.0022	400	12049	SI2200	D6-222	CUB6D22	GP2-333-222	PT6222	6TM-D22	
C5	.0022	400	12049	SI2200	D6-222	CUB6D22	GP2-333-222	PT6222	6TM-D22	
C6	.047	400	12009	BPD-05	DF-503	CUB4S47		PT4147	4TM-S47	
C7	.047	400	12009	BPD-05	DF-503	CUB4S47		PT4147	4TM-S47	

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: V-M PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	500KΩ	½	11996	AB-60				Volume
B	Shaft		Not Req.	AK-4				Attach to R1A.
R2A	1Meg	½	11995	BB-108	DC-35-S		UF16L	Tone
B	1Meg	½					UR16L	
C	Shaft						DS-36	Attach to R2B.

RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: V-M PART No.	IRC PART No.	NOTES
R3	220KΩ	½	11293	BTS-220K	
R4	5.6Meg	½	11633-10	BTS-5.6Meg	
R5	220KΩ	½	11293	BTS-220K	
R6	3900Ω	½	10873-10	BTS-3900	
R7	10KΩ	½	10973	BTS-10K	
R8	22KΩ	½	11053	BTS-22K	
R9	22KΩ	½	11053	BTS-22K	
R10	1Meg	½	11453	BTS-1Meg	
R11	220KΩ	½	11293	BTS-220K	

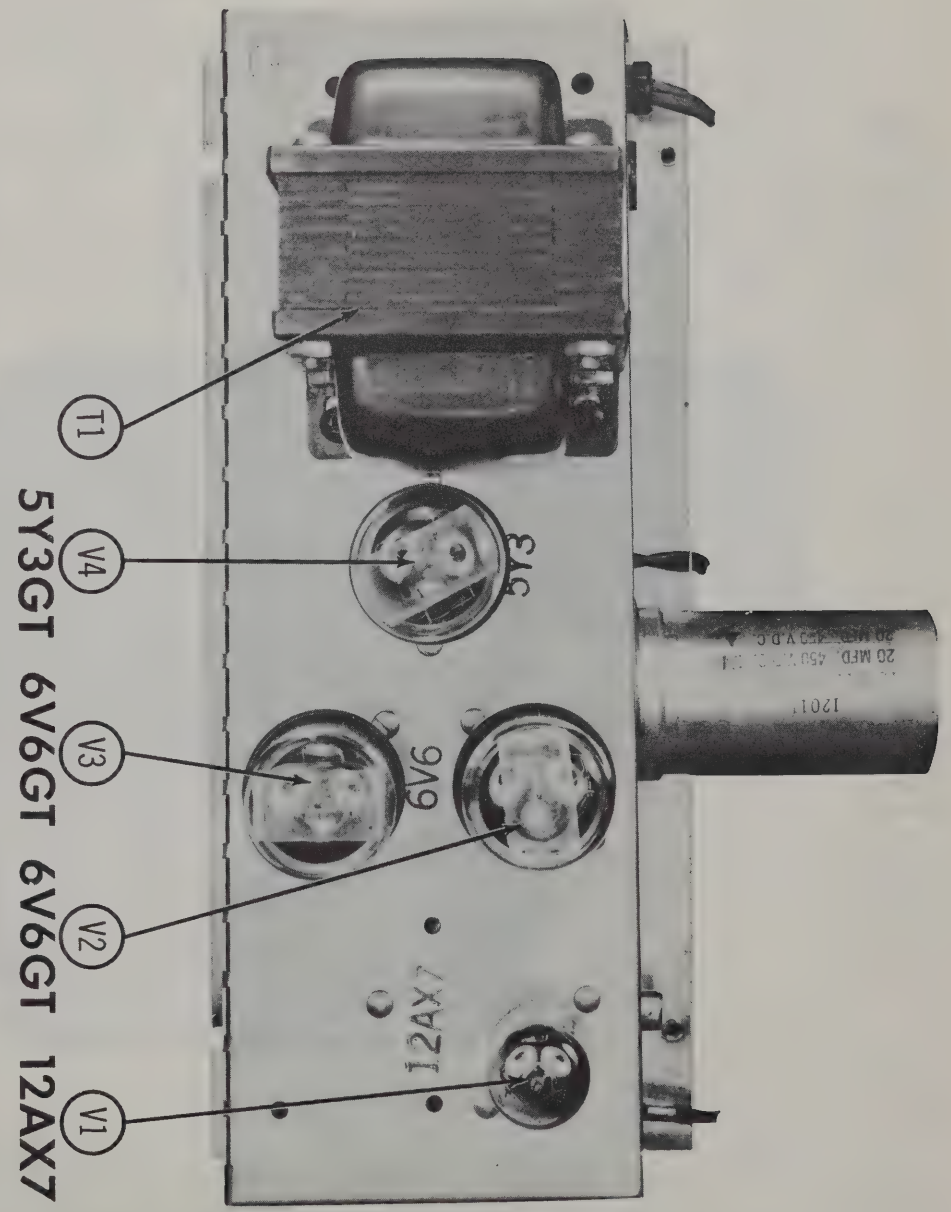
ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: V-M PART No.	IRC PART No.	NOTES
R12	1000Ω	½	10733	BTS-1000	
R13	220KΩ	½	11293	BTS-220K	
R14	100KΩ	½	11213	BTS-100K	
R15	470KΩ	½	11373	BTS-470K	
R16	470KΩ	½	11373	BTS-470K	
R17	200Ω	5	11979	PW7-200	
R18	47KΩ	½		BTS-47K	
R19	470Ω	2	10655	BTB-470	

TRANSFORMER (POWER)

ITEM No.	RATING: PRI.	RATING: SEC. 1	RATING: SEC. 2	RATING: SEC. 3	REPLACEMENT DATA: V-M PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC @.46A	546VCT .077A	5VAC @2A	6.3VCT @1.3A	12518-1	P9304 ①		PC-8405①	22R02 ②	R-9A ①

① Drill new mounting holes.
② Use universal mounting feet.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	V-M PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	6.3KΩ CT	1.5Ω	12519-3	Z1011	A-2904 ①	A-3830	26S59 ②	S-55X	① Drill one new mtg. hole. ② Use 3.5Ω tap on secondary.

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	V-M PART No.	QUAM PART No.	
SP1	3½"	PM	3.4Ω	8230-7	3A15TZ3.4	
SP2	12"	PM	3Ω	8317-1	12A4A	

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA					REMARKS
	V-M PART No.	ASTATIC PART No.		ELECTRO-VOICE PART No.		
		CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	
M1	9121	112-TS	A-1 and A-3	46T	0-1 or S-1 and 0-3	

ASTATIC AND ELECTRO-VOICE NEEDLE LISTINGS SHOWN ABOVE ARE SPECIFIED FOR THE RESEPECTIVE REPLACEMENT CARTRIDGES LISTED. FOR ORIGINAL CARTRIDGE NEEDLE REPLACEMENT SEE BELOW.

PHONO NEEDLE

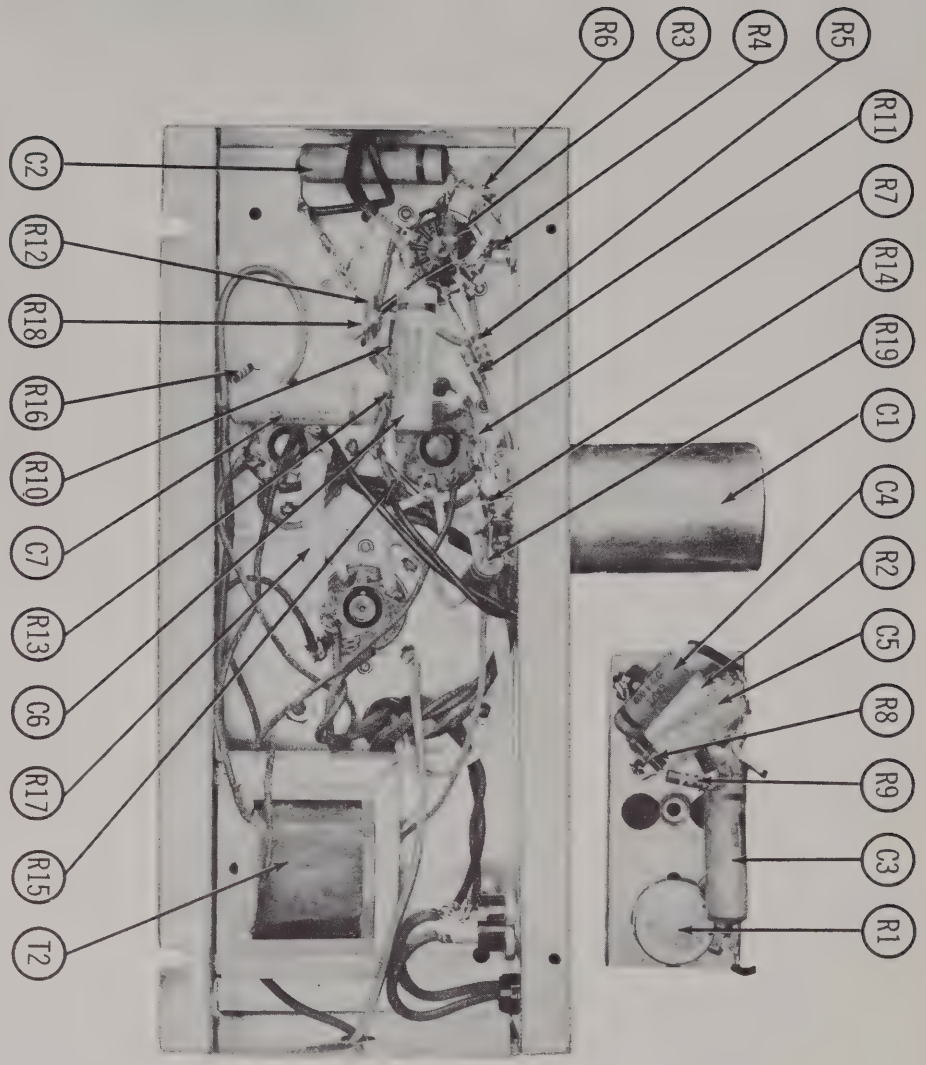
(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

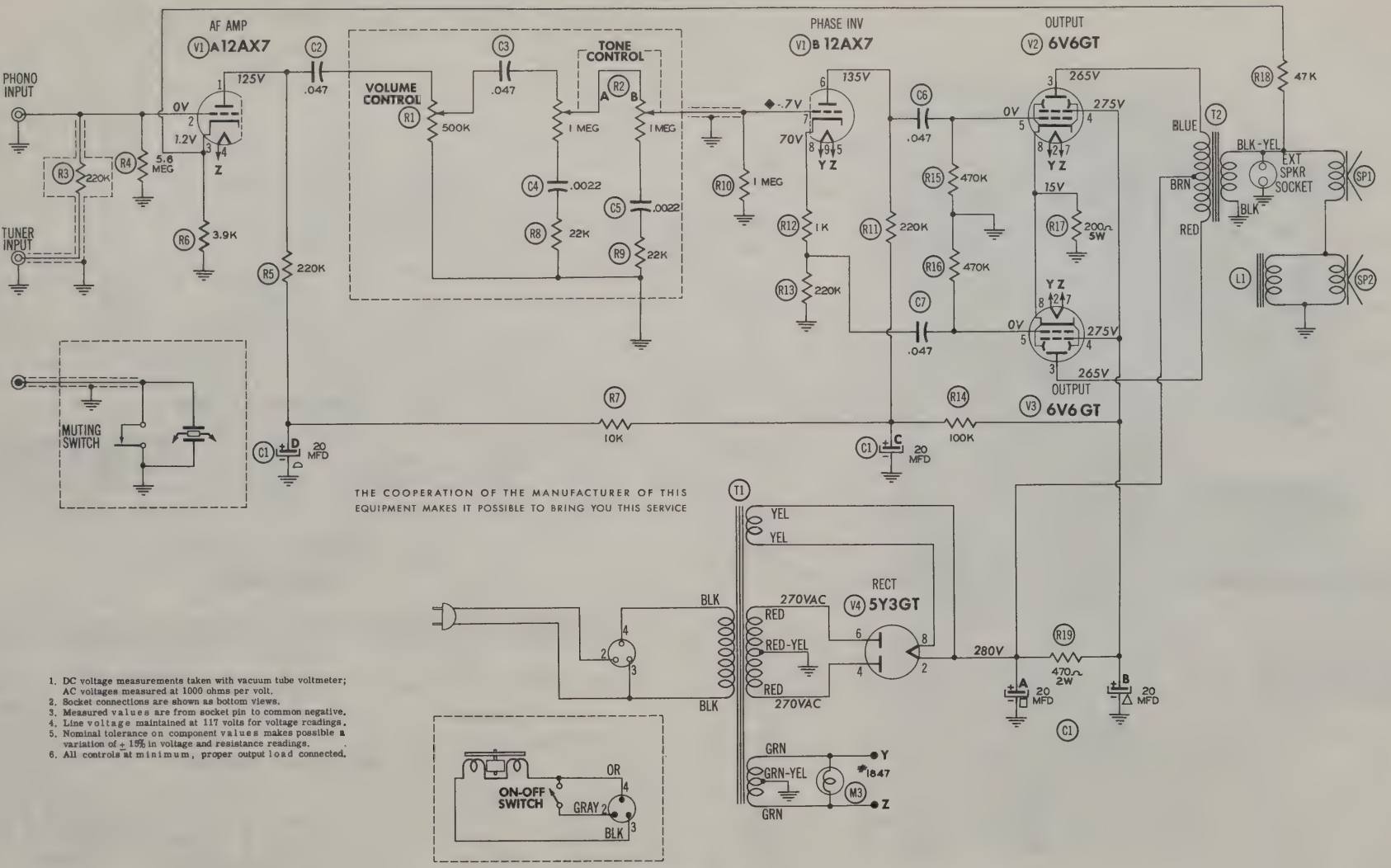
ITEM No.	REPLACEMENT DATA				REMARKS
	V-M PART No.	JENSEN PART No.	PERMO PART No.	WALCO PART No.	
M2	78RPM Needle	†CR-55 or ♦CR-55D	†C-449 or ♦C-449D	†W-64S	† Jewel ♦ Diamond
	16 2/3, 33 1/3, and 45RPM Needle	†CR-55LP or ♦CR-55LPD	†A-448 or ♦A-448D	†W-64MGS	

MISCELLANEOUS

ITEM No.	PART NAME	V-M PART No.	NOTES
M3	Pilot Light	7791	#1847
	Cabinet	9184-B	Model 565B
	Cabinet	9184-M	Model 565M
	Knob	7690	Volume & Tone
	Lucite Rod	9195	Lazy Lite

CHASSIS—BOTTOM VIEW





1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	12AX7	†330KΩ	5.6Meg	3.6KΩ	.1Ω	.1Ω	†320KΩ	1Meg	22KΩ	.1Ω
V 2	6V6GT	NC	.1Ω	†300Ω	†470Ω	470KΩ	TP	.1Ω	200Ω	
V 3	6V6GT	NC	.1Ω	†300Ω	†470Ω	470KΩ	TP	.1Ω	200Ω	
V 4	5Y3GT	NC	200KΩ	NC	120Ω	NC	120Ω	NC	200KΩ	

†MEASURED FROM PIN 2 OF V4.
♦ MEASURED FROM PIN 8 OF V1.

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306-13

PHOTOFACT* Folder

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ZENITH MODELS X2220R, RU, X2222E, EU, G, GU, L, LU, R, RU, Y, YU, X2224E, EU, R, RU, Y, YU, X2232E, EU, R, RU, X2247E, EU, R, RU, X2248E, EU, R, RU, X2280E, EU, R, RU (Ch. 17X20, U, 17X22, U & Audio Ch. 3X01)

ZENITH MODEL X2220R

TRADE NAME	ZENITH	MODELS	CHASSIS
		X2220R, RU, X2222E, EU, G, GU, L, LU, R, RU, Y, YU	17X20, U
		X2232E, EU, R, RU, X2247E, EU, R, RU, X2248E, EU, R, RU	17X22, U
		X2280E, EU, R, RU	17X22, U, & Audio CH. 3X01
MANUFACTURER	Zenith Radio Corp., 6001 Dickens Ave., Chicago 39, Illinois		
TYPE SET	Television Receiver		
TUBES	Seventeen		
POWER SUPPLY	110-120 Volts AC-60 Cycle	RATING	1.44 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)		

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DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 3 push-on type control knobs from front panel and 4 push-on type control knobs from top panel of cabinet.
2. Remove 8 metal screws and rear cover.
3. Disconnect speaker leads.
4. Remove 5 metal screws holding chassis to cabinet, slide chassis out of cabinet.
5. Remove 2 speaker nuts. Remove speaker.

MODELS	CHASSIS
X2220R, RU, X2222E, EU, G, GU, L, LU, R, RU, Y, YU	17X20, U
X2232E, EU, R, RU, X2247E, EU, R, RU, X2248E, EU, R, RU	17X22, U
X2280E, EU, R, RU	17X22, U & Audio Ch. 3X01

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF Tuner Oscillator Circuit may be accomplished by removing the Channel Selector and Fine Tuning Knobs.

PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass remove 3 push-on type control knobs. Remove 2 metal screws holding 2 metal trim plates. Remove trim plates and safety glass. Use extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION

See tube placement chart on page 5.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

For adjustment of the horizontal stabilizer slug (B1) it is necessary to remove the rear cover and supply power to the set.
Set the horizontal hold control to its center range position and adjust B1 until the picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

Adjust the buzz control (R8) located on top of the chassis for maximum volume and minimum buzz.

FUSES

One fuse is used for Horiz. Sweep Circuit protection. (For location see Tube Placement Chart).

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly centered.

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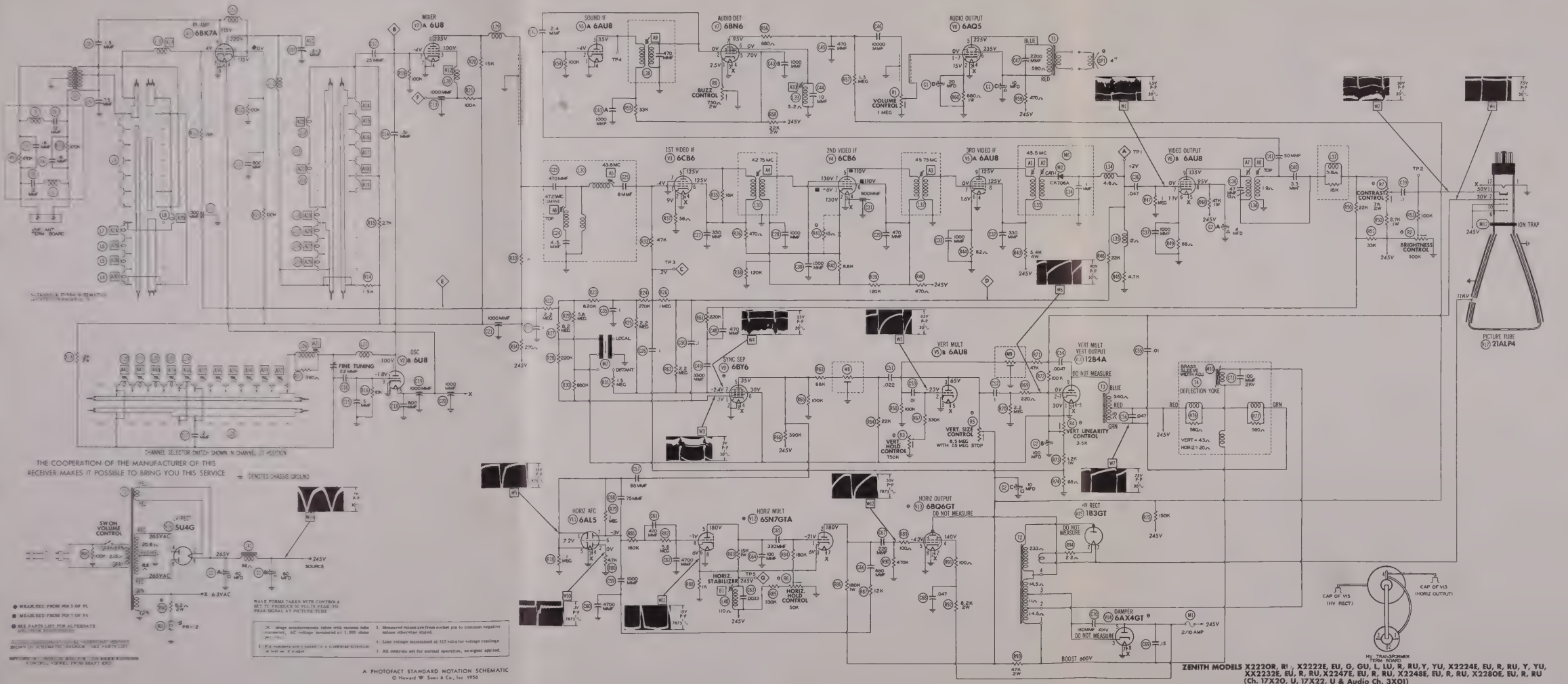

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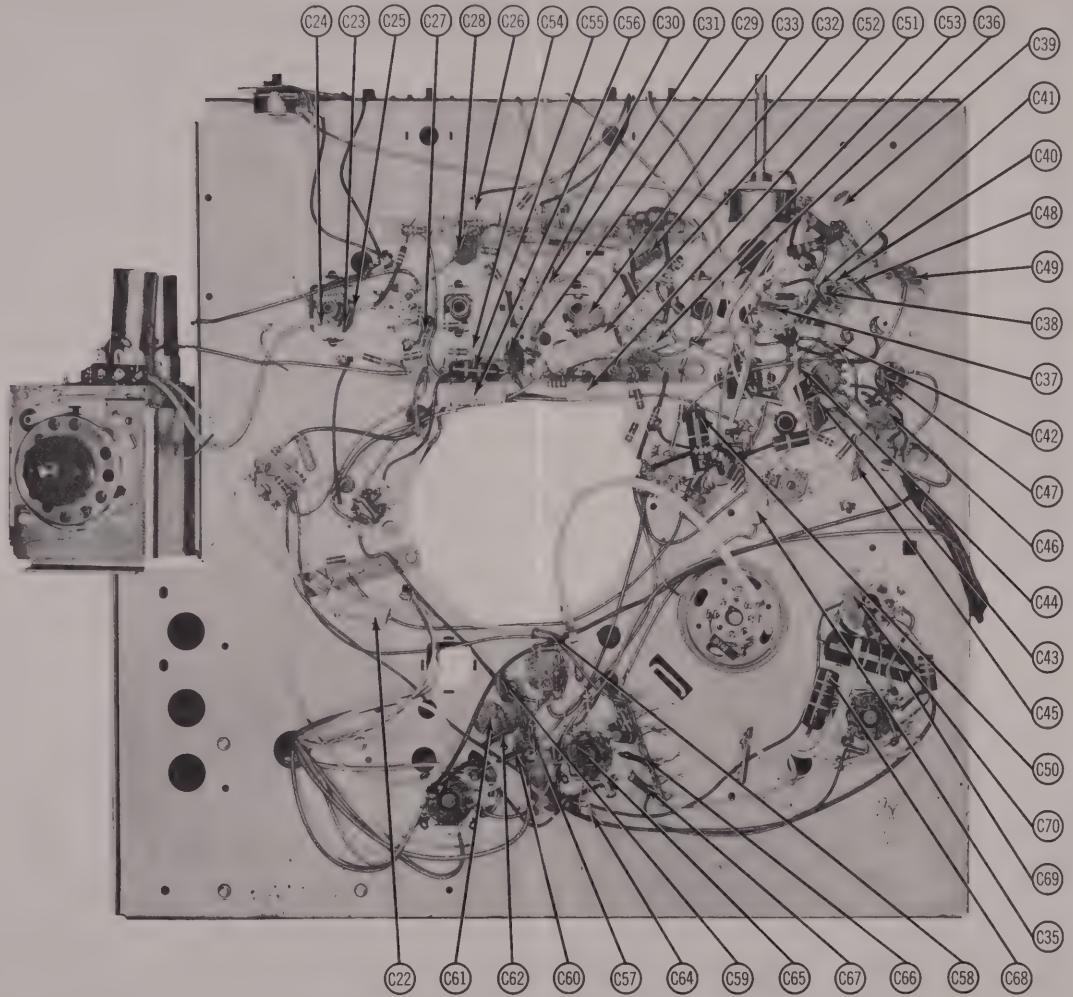

CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

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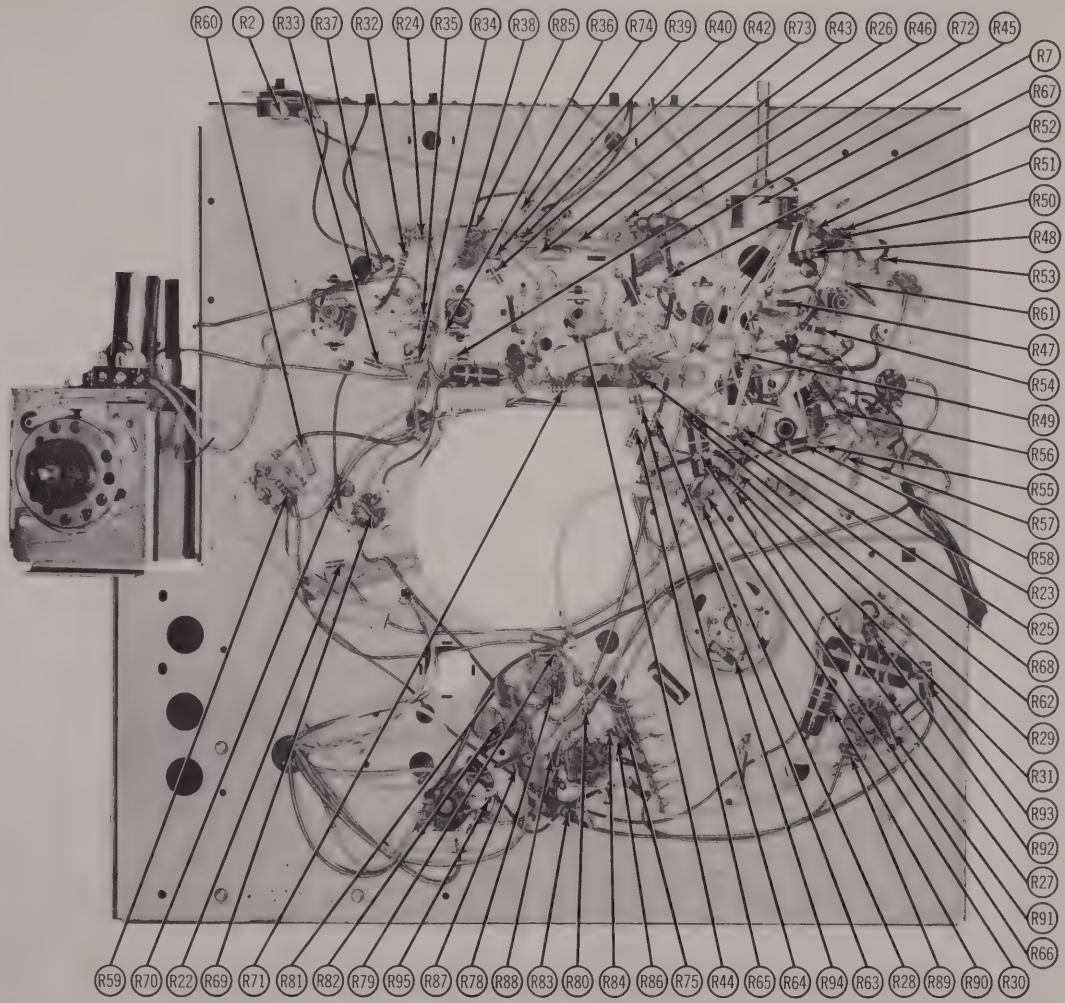

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CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

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TUBE PLACEMENT CHART

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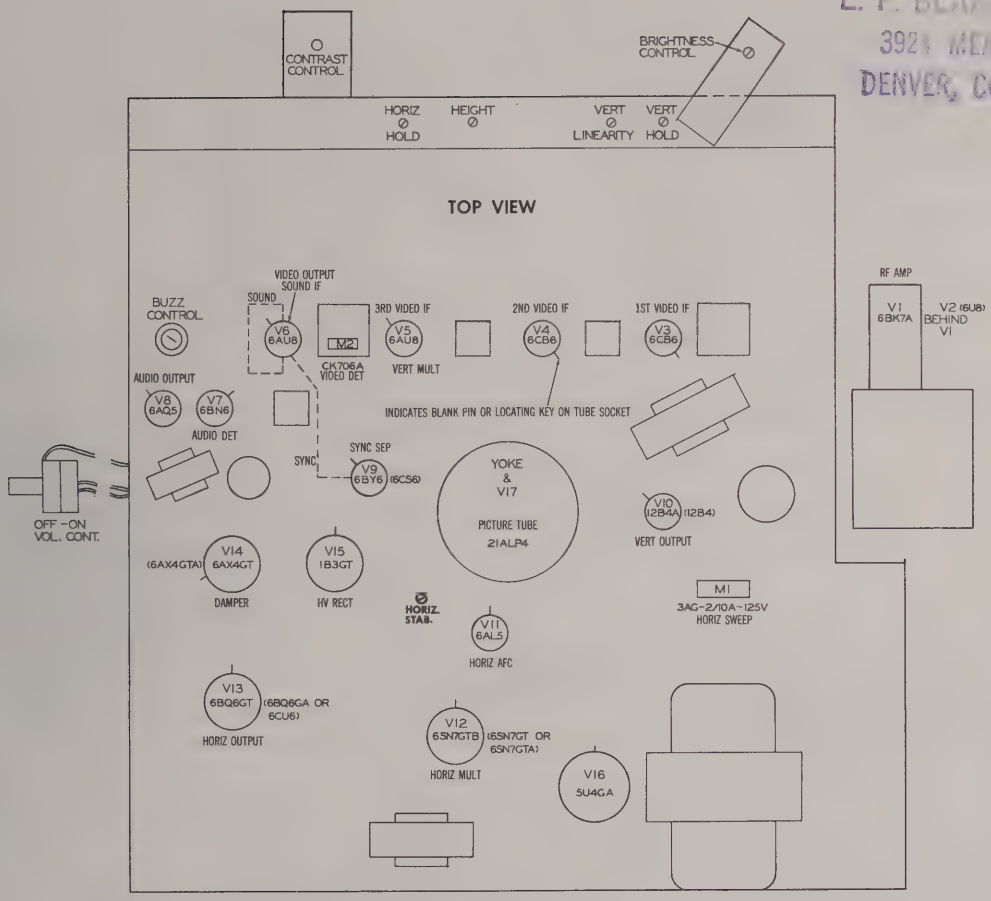

TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - V16

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V2, V3, V4, V5, V6
No pic, no sound, has snow - V1, V2, V3
No pic, has sound, has raster - V6, V17
Has pic, no sound - V6, V7, V8

SYNC FAILURE
No vert. sync - V5, V9, V10
No horiz. sync - V9, V11, V12
No vert. or horiz. sync - V9

SWEEP FAILURE
No raster, has sound - V12, V13, V14, V15, V17, Fuse (M1)
No vertical deflection - V5, V10
Poor vert. linearity or foldover - V5, V10
Poor horiz. linearity or foldover - V12, V13, V14
Narrow picture - V12, V13, V14, V15, V16
Vert. off freq. - V5, V9, V10
Horiz. off freq. - V9, V11, V12

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ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage lead should be securely taped and kept away from chassis. Do not remove the horizontal multivibrator tube (V12) to disable the high voltage.

VIDEO IF ALIGNMENT

Remove the osc-mixer tube (V2) from its socket and connect a wire to pin 9. Replace V2 in its socket and connect a clip lead from loose end of wire to chassis. Connect the negative lead of a 5 volt bias supply to point Ⓒ. Connect positive lead to chassis. Connect a clip lead from point Ⓓ to chassis. In step 6 attenuate sweep generator output to maintain not more than 3 volts peak to peak on scope. Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	470MMF	High side to point Ⓑ. Low side to chassis.	Not used	45.5MC (Unmod)	Any	Use VTVM. DC probe to point Ⓐ. thru a 10KΩ resistor. Common to chassis.	A1, A2	Attenuate generator output to maintain not more than -2 volts at VTVM.
2.	"	"	"	45.75MC	"	"	A3	"
3.	"	"	"	42.75MC	"	"	A4	"
4.	"	"	"	43.6MC	"	"	A5	"
5.	"	"	"	47.25MC	"	"	A6	Increase generator output for usable reading on VTVM. Adjust for MINIMUM deflection. Repeat steps 1 thru 5.
6.	"	"	43MC (10MC Swp)	41.25MC 42.75MC 45.0MC 45.75MC 47.25MC	"	Vert. Amp. thru 10KΩ to point Ⓐ. Low side to chassis.		Check for response similar to Fig. 1. If necessary retouch A1 thru A5 to obtain desired response. Adjust A3 for maximum amplitude of response curve and position of 45.75MC marker. Adjust A4 for position of 42.75MC marker. A1 and A2 affect bandwidth. A5 affects top portion of curve. Increase sweep output and check position of 47.25MC trap. If necessary, SLIGHTLY retouch A6 for correct position of 47.25MC marker. The 41.25MC marker should be in proper position on curve after correct bandpass and other marker positions are obtained. Remove wire from pin 9 of V2. Disconnect the bias supply and clip lead from point Ⓓ.

SOUND IF ALIGNMENT

Connect an attenuator (Zenith part #S-17203 or equivalent) in series with the receiver antenna.
Tune in a modulated TV signal and adjust the attenuator until the signal falls below the limiting level of the 6BN6 (limiter detector), as evidenced by a hiss similar to super-regeneration.
Adjust the sound take-off transformer (A7 and A8) the sound IF transformer (A9) and the quadrature coil (A10) for maximum sound of best quality.
Adjust the buzz control (R8) for minimum intercarrier buzz.
If during alignment of the sound IF the signal rises above the limiting level of the 6BN6 (hiss disappears) increase the attenuation until hiss returns.

VHF RF AND MIXER ALIGNMENT

Connect the negative lead of a 2 volt bias supply to point Ⓔ on tuner.
Connect the positive lead to chassis.
Set the RF trimmer A11 at its center adjustment position. A11 should not require further adjustment unless the RF tube (V1) is replaced.
Preset A38 at its center adjustment position. In step 14 adjustment A22 is not necessary if proper bandpass is obtainable by adjusting A21.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection. The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
7.	Fig. 2	Across antenna terminals thru matching network (Fig. 2).	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. thru 10KΩ to point Ⓕ. Low side to chassis.	A12, A13	Check for response curve similar to Fig. 3. If necessary, adjust A12 by expanding or compressing coil turns for proper band width. Adjust A13 by expanding or compressing coil turns for maximum amplitude of response curve.
8.	"	"	27MC (10MC Swp)	205.25MC 209.75MC	12	"	A14	Check for response curve similar to Fig. 3. If necessary adjust by bending loop in or out from switch rotor for proper response.
9.	"	"	201MC (10MC Swp)	199.25MC 203.75MC	11	"	A15	"
10.	"	"	195MC (10MC Swp)	193.25MC 197.75MC	10	"	A16	"
11.	"	"	189MC (10MC Swp)	187.25MC 191.75MC	9	"	A17	"
12.	"	"	183MC (10MC Swp)	181.25MC 185.75MC	8	"	A18	"
13.	"	"	177MC (10MC Swp)	175.25MC 179.75MC	7	"	A19	"
14.	"	"	85MC (10MC Swp)	83.25MC 87.75MC	6	"	A20, A21, A22	Adjust A21 and A22 for correct bandpass. Adjust A20 for maximum amplitude similar to Fig. 3. A20, A21 and A22 are adjusted by expanding or compressing coil turns.
15.	"	"	79MC (10MC Swp)	77.25MC 81.75MC	5	"	A23, A24	Adjust by expanding or compressing coil turns for response curve similar to Fig. 3.
16.	"	"	69MC (10MC Swp)	67.25MC 71.75MC	4	"	A25, A26	"
17.	"	"	63MC (10MC Swp)	61.25MC 65.75MC	3	"	A27, A28	"
18.	"	"	57MC (10MC Swp)	55.25MC 59.75MC	2	"	A29, A30	"

ALIGNMENT INSTRUCTIONS (cont)

VHF OSCILLATOR ALIGNMENT

Connect bias as under "Video IF Alignment". Set the fine tuning control to the position where the brass flat shaft is in a horizontal position. Leave it at this mid-range position during entire alignment. Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection. The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
19.	Fig. 2	Across antenna terminals thru matching network (Fig. 2).	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. thru 10KΩ to point (A). Low side to chassis.	A31	Adjust to place video marker at 50% on response curve as shown in Fig. 4. Sound marker should be at 5%.
			207MC (10MC Swp)	205.25MC 209.75MC	12		A32	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A33	
			195MC (10MC Swp)	193.25MC 197.75MC	10		A34	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A35	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A36	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A37	
			85MC (10MC Swp)	83.25MC 87.75MC	6		A38	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A39	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A40	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A41	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A42	

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UHF TUNER ALIGNMENT

Alignment of the UHF tuner should not be attempted unless proper test equipment is available. Switch the receiver to UHF position. Connect the negative lead of a 2 volt bias supply to point (C). Connect positive lead to chassis. Adjust the sweep generator output to provide 3 volt peak to peak on scope. Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection. The sweep generator output lead should be terminated with its characistic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
20.	Fig. 5	Across antenna terminals thru matching network (Fig. 5).	713MC (10MC Swp)	711.25MC	54	Vert. Amp. thru 10KΩ to point (A). Low side to chassis.	A43,A44, A45	Tuner rocker arm should be in the horizontal position. If necessary, loosen set screw and adjust tuner so that rocker arm is horizontal when the channel indicator is set to channel 54. Do not adjust A43 unless oscillator calibration is off more than 3 channels. If necessary, adjust A43 to place video marker at 50% on response curve as in Fig. 4. The image (weaker response) will appear also. The response toward the counter clockwise position of A43 is the proper response. Adjust A44 and A45 for maximum amplitude of response similar to Fig. 4.
21.	"	"	473MC (10MC Swp)	471.25MC	14	"		Check for response curve similar to Fig. 4. If oscillator is off more than 3 channels adjust the oscillator travel (osc. mixer and antenna travel adjustments are the three round thumb screws on top of tuner) adjustment to scale. Care must be used in making this adjustment so as not to move the rocker arm out of its bearing. Set the mixer and antenna travel adjustments for maximum response on scope.
22.	"	"	887MC (10MC Swp)	885.25MC	83	"	A46,A47 A48	Adjust A46 to place marker at 50% as in Fig. 4. Adjust A47 and A48 for maximum amplitude and symmetry of response similar to Fig. 4.

UHF ADAPTER ALIGNMENT (PART #S22790)

This portion has been properly aligned at the factory and is very stable. Alignment of this portion should not be required in the field.

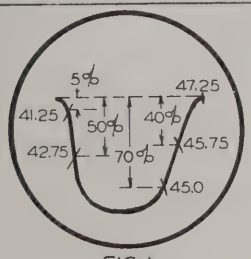
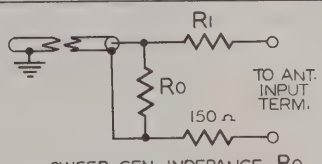


FIG. 1



SWEEP GEN. INDEPANCE = R0

Z0	R0	R1
50 Ω	50 Ω	120 Ω
75 Ω	82 Ω	110 Ω
92 Ω	110 Ω	100 Ω

FIG. 2

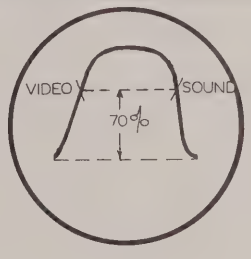


FIG. 3

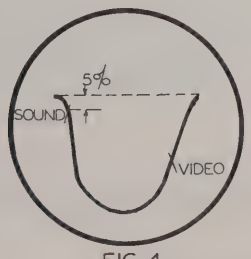


FIG. 4

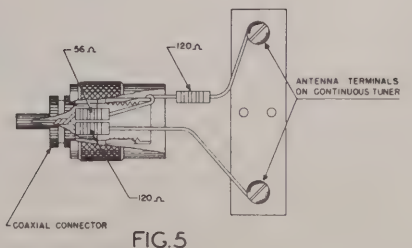


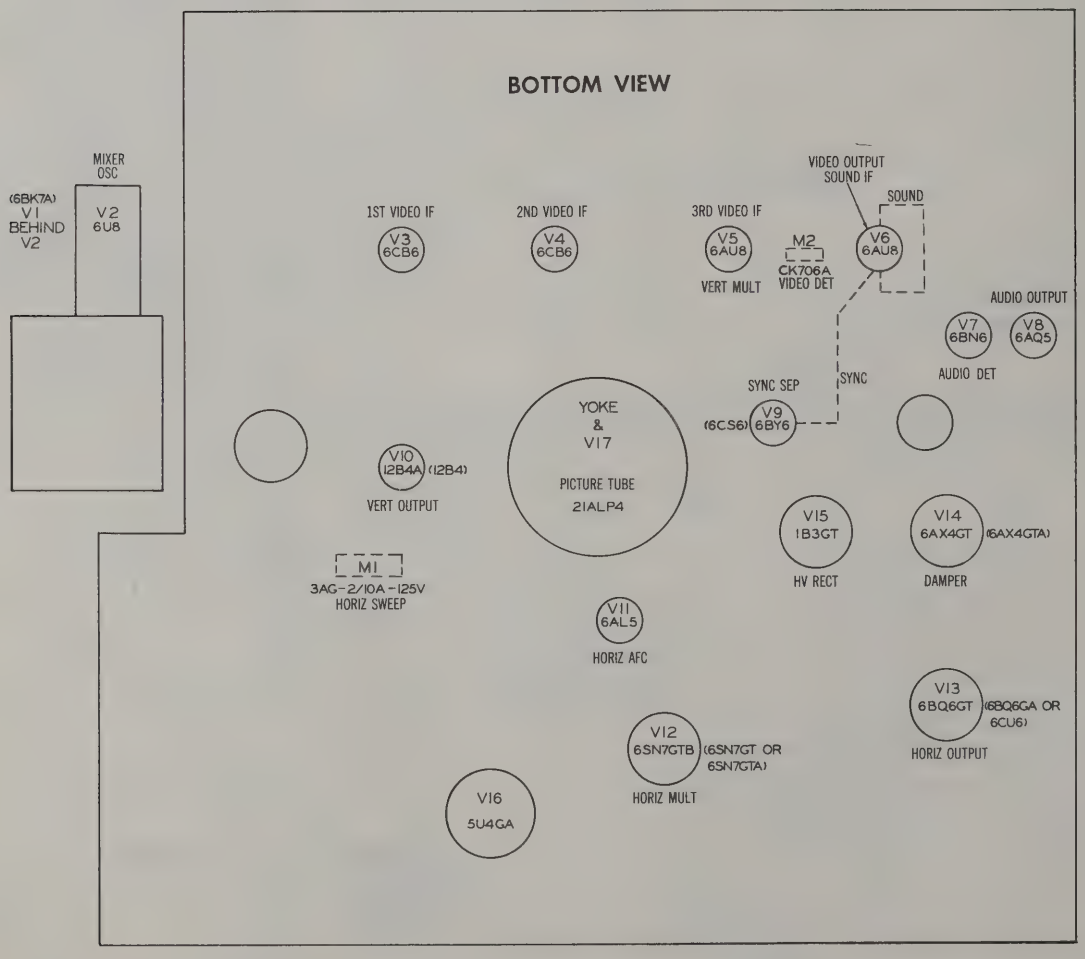
FIG. 5

ZENITH MODELS X222OR, RU, X2222E, EU, G, GU, L, LU, R, RU, Y, YU, X2224E, EU, R, RU, Y, YU, X2232E, EU, R, RU, X2247E, EU, R, RU, X2248E, EU, R, RU, X2280E, EU, R, RU (Ch. 17X20, U, 17X22, U & Audio Ch. 3X01)

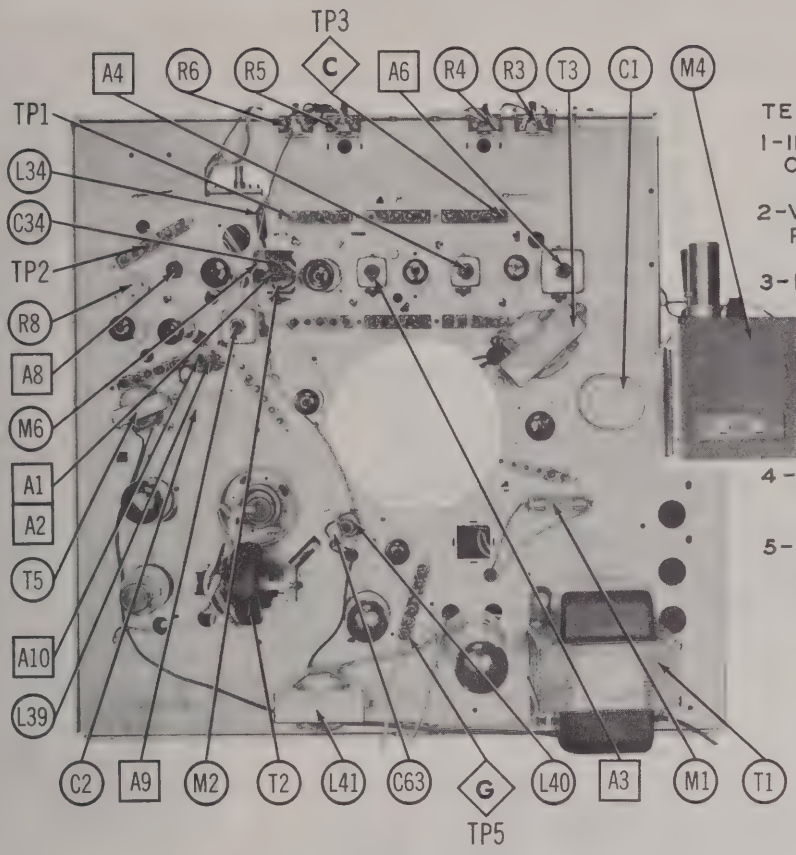
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BK7A	†L 4KΩ	50KΩ	INF	. 1Ω	0Ω	INF	3. 5Meg	0Ω	0Ω
V 2	6U8	†12KΩ	100KΩ	†100KΩ	0Ω	. 1Ω	†L 3KΩ	0Ω	0Ω	10KΩ
V 3	6CB6	800KΩ	56Ω	0Ω	. 1Ω	▲470Ω	▲470Ω	0Ω		
V 4	6CB6	80KΩ	80KΩ	0Ω	. 1Ω	†500Ω	†500Ω	80KΩ		
V 5	6AU8	0Ω	700KΩ	◓230KΩ	0Ω	. 1Ω	82Ω	. 1Ω	†5. 4KΩ	†5. 4KΩ
V 6	6AU8	0Ω	100KΩ	†55KΩ	0Ω	. 1Ω	68Ω	1Meg	†47KΩ	†8. 5KΩ
V 7	6BN6	400Ω	. 5Ω	0Ω	. 1Ω	†22KΩ	5. 2Ω	◓1. 5Meg		
V 8	6AQ5	400KΩ	680Ω	0Ω	. 1Ω	†L 1KΩ	†500Ω	400KΩ		
V 9	6BY6	220KΩ	0Ω	0Ω	. 1Ω	†80KΩ	2KΩ	1. 3Meg		
V 10	12B4A	2KΩ	2. 2Meg	0Ω	. 1Ω	. 1Ω	TP	2. 2Meg	TP	†600Ω
V 11	6AL5	1Meg	4. 7K	0Ω	. 1Ω	1Meg	NC	2Meg		
V 12	6SN7GTB	200KΩ	◓220KΩ	1KΩ	8Meg	†15KΩ	1KΩ	. 1Ω	0Ω	
V 13	6BQ6GT	TP	. 1Ω	TP	†8. 4KΩ	470KΩ	TP	0Ω	0Ω	TOP CAP ◓14. 5Ω
V 14	6AX4GT	TP	NC	150KΩ	NC	†70Ω	NC	0Ω	. 1Ω	
V 15	1B3GT		PINS	1-8	HAVE	INF	RESISTANCE			TOP CAP ◓248Ω
V 16	5U4GA	NC	50KΩ	TP	21Ω	NC	19Ω	TP	50KΩ	
V 17	21ALP4	0Ω	100KΩ	PIN 6 †66Ω	PIN 10 †66Ω	PIN 11 †180KΩ	PIN 12 . 1Ω			

†MEASURED FROM PIN 8 OF V16.
▲MEASURED FROM PIN 7 OF V4.
◓MEASURED FROM PIN 3 OF V14.
TP-TIE POINT
NC-NO CONNECTION
"LOCAL-DISTANCE" SWITCH IN LOCAL POSITION.



TUBE PLACEMENT CHART



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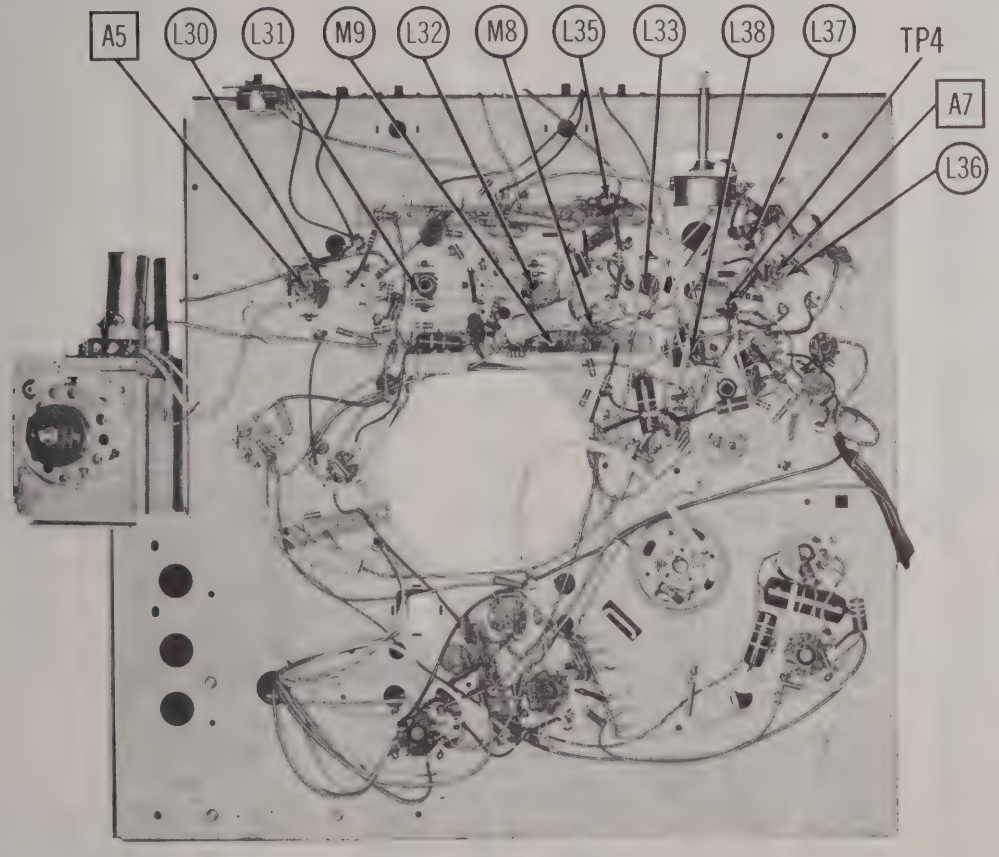
DENVER, COLORADO

CHASSIS-TOP VIEW



CHASSIS BOTTOM VIEW INDUCTOR AND ALIGNMENT IDENTIFICATION

SET 306 FOLDER 14

ZENITH MODELS X2220R, RU, X2222E, EU, G, GU, L, LU, R, RU, Y, YU, X2224E, EU, R, RU, Y, YU, X2232E, EU, R, RU, X2247E, EU, R, RU, X2248E, EU, R, RU, X2280E, EU, R, RU (Ch. 17X20, U, 17X22, U & Audio Ch. 3X01)

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: SYLVANIA PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	RF Amplifier	6BK7A	6BA7		
V2	Conv.-Mixer	6U8	6U8		
V3	1st. Video IF Amp.	6CB6	6CB6	TCM	
V4	2nd. Video IF Amp.	6CB6	6CB6	TCM	
V5	3rd. Video IF Amp.-Vert. Mult.	6AU8	6AU8	8DX	
V6	Video Output-Sound IF Amp.	6AU8	6AU8	8DX	
V7	Audio Detector	6BN6	6BN6	TDY	
V8	Audio Output	6AQ8	6AQ5	TBE	
V9	Sync Separator	6BY6	6BY6	TCH	6CB6 may be used as an alternate
V10	Vert. Mult.-Vert. Output	12BH4	12BH4	8AG	12BH4 may be used as an alternate
V11	Horiz. AFC	6AL8	6AL8	8BY	
V12	Horiz. Mult.	6HV6GTB	6HV6GTB	8BD	6HV6GT or 6HV6GTA may be used as an alternate
V13	Horiz. Output	6BQ6GT	6BQ6GT	6AM	6BQ6GA or 6CU6 may be used as an alternate
V14	Damper	6AX4GT	6CG3	6AM	6AX4GTA may be used as an alternate
V15	HV Rectifier	1B3GT	1B3GT	1C	
V16	LV Rectifier	5U4GA	5U4GA	5T	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA: ZENITH PART No.	REPLACEMENT DATA: CBS PART No.	REPLACEMENT DATA: GENERAL ELECTRIC PART No.	REPLACEMENT DATA: SYLVANIA PART No.	REPLACEMENT DATA: WESTINGHOUSE PART No.	RETMA BASE TYPE	NOTES
V17	21ALP4 21ALP4A ①		21ALP4 ①	21ALP4 21ALP4A ② 21ALP4A ③	21ALP4 21ALP4A ①	12L 12L 12L	① Aluminized ② Silver screen

ELECTROLYTIC CAPACITORS

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: ZENITH PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: CORNELL-DUBILIER PART No.	REPLACEMENT DATA: MALLORY PART No.	REPLACEMENT DATA: PYRAMID PART No.	REPLACEMENT DATA: SANGAMO PART No.	REPLACEMENT DATA: SPRAGUE PART No.
C1A	40	400	23-3547	E40D79		FP385.5 TC26	TM-B04020-450 TD-35-35	T-180 FM-0235	TVL-4736 TVA-1715
B	80	400							
C	10	400							
D	10	25							
C2A	4	350	23-3546	E3C503		FP387.1	TM-3061	T-817	TVL-4805
B	100	50							
C	10	475							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: ZENITH PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: CENTRALAB PART No.	REPLACEMENT DATA: CORNELL-DUBILIER PART No.	REPLACEMENT DATA: ERIE PART No.	REPLACEMENT DATA: MALLORY PART No.	REPLACEMENT DATA: SPRAGUE PART No.	NOTES
C2	12		23-3579		TCS-12	ZU12	NP0X-120 N330X-180 N330X-180 N750X-120			
C4	18		23-3580							
C5	18		23-3580		TCS-18	ZU18				
C6	18		23-3579							
C7	1000		23-3577		NP0-471.5	TC26-1R5	T2S04	NP9A-1R5	ET-5515	57CCB-V15
C8	1.5		23-3434							
C9	7.5		23-3435							
C10	5-3		23-3452		518-3			31A5-01-CR5	CT585A	
C11	500		23-3331	RPD-0006	DD-501	K069	831-501	DC-531	5GA-T5	
C12	25		23-3571	M750-DZ25	TCM-25	M025		M750K-350		57CU-Q25
C13	1000		23-3577							
C14	.01		23-3576							
C15	5		23-3574							
C16	25		23-3571	M750-DZ25	TCM-25	TM06		M750K-330		57CU-Q25
C17	2		23-3573							
C18	500		23-3331	RPD-0006	DD-501	K069	831-501	DC-531	5GA-T5	
C19	1000		23-3577							
C20	1000		23-3577							
C21	1000		23-3577							
C22	.1	200	23-1777	PS85N-1	DF-104	CUB2P1		831-471	PT401	57M-P1
C23	470		23-0	RPD-00047	DD-471	K060			5GA-T47	
C24	6.5		23-3577							
C25	8		23-3481							
C26	.1	200	23-1777	PS85N-1	DF-104	CUB2P1			PT401	57M-P1
C27	330		23-3306	H330	D6-331	TP43	GP2K-331	501-331	DC-5333	5GA-T33
C28	1000		23-7	BPD-001	DD-102	K069	831-001	DC-532	5HK-D1	
C29	470		23-3303	SH70	D6-471	TP45	GP2K-471	DC-5347	5GA-T47	
C30	1000		23-7	BPD-001	DD-102	K069	501-001	DC-531	5HK-D1	
C31	500		23-3577	MFC-1000	RF-001				5GA-T6	
C32	330		23-3545	H330	D6-331	TP43	GP2K-331	DC-5333	5GA-T33	
C33	1000		23-7	BPD-001	DD-102	K069	501-001	DC-531	5HK-D1	
C34	.1		23-1783	NPO-221	TCS-1	TS03	NP0A-S10		57CCB-V1	
C35	.1	300	23-1777	PS85N-1	DF-104	CUB2P1			PT401	57M-P1
C36	.047	300	23-1776	BPD-09	DF-503	CUB2B47			PT4047	57M-B47
C37	1000		23-7	BPD-001	DD-102	K069	501-001	DC-531	5HK-D1	
C38	47		23-3467							
C39	.1	300	23-1777	PS85N-1	DF-104	CUB2P1			PT401	57M-P1
C40	3.3		23-3543	MPG-S33.3	TCZ-S33	TZ05	NP0A-3R3	ZT-5533	57CCB-V33	
C41	50		23-3560	SJ50	D6-500	TP50	GP1K-500	DC-545	5GA-Q5	
C42	3.6		23-3596							
C43A	1000		23-31	BPD-EX001	DD3-103	DE069	S2S-001	DC3-501	5HK-HD1	
B	1000									
C44	18		23-3576							
C45	470		23-6	BPD-00047	DD-471	K060	831-471	DC-5347	5GA-T47	
C46	10000		23-3	BPD-01	DD-103	K079	S1L-01	DC-531	5HK-S1	
C47	2200		23-8	BPD-0023	DE-232	K073	S1L-0023	DC-5333	5HK-D23	
C48	470		23-6	BPD-00047	DD-471	K060	831-471	DC-5347	5GA-T47	
C49	2200		23-13	BPD-0023	DE-232	K073	S1L-0023	DC-5333	5HK-D33	
C50	.1	300	23-1777	PS85N-1	DF-104	CUB2P1			PT401	57M-P1
C51	.023	400	23-3551							
C52	.1	400	23-3061	P485N-1	DF-104	CUB4P1			PT401	47M-P1
C53	.01	300	23-3565				NR5D47		MC3465	MS-347
C54	.0047	600	23-1849	1464-0047				GP3-333-103	PT4L	47M-S1
C55	.01	400	23-1846	BPD-01	DE-103	CUB401	GP3-333-103		PT4L47	47M-S47
C56	.047	300	23-1776	BPD-05	DF-503	CUB2B47			PT4L47	57M-S47
C57	68		23-3565	HPG-S3S5	DD-680	TZ35	S01-680			57CC-Q68
C58	75		23-1746	S75	D6-750	TP33	GP1K-750	DC-5475	S0A-Q75	
C59	1000		23-17	BPD-001	DD-102	K069	501-001	DC-521	5HK-D1	
C60	4700		23-3534	BPD-0047	DD-472	K079	S1L-0047	DC-5347	5HK-D47	
C61	470		23-6	BPD-00047	DD-471	K060	831-471	DC-5347	5GA-T47	
C62	4700		23-3550	BPD-0047	DD-472	K079	S1L-0047	DC-5347	5HK-D47	
C63	.0033	300	23-3564	1464-0033			NR3D33		MC3335	MS-333
C64	100		23-3	1464-0001	DD-101	S0-Y1		801-101		MS-33

PARTS LIST AND DESCRIPTIONS

CAPACITORS (cont)

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: ZENITH PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: CENTRALAB PART No.	REPLACEMENT DATA: CORNELL-DUBILIER PART No.	REPLACEMENT DATA: ERIE PART No.	REPLACEMENT DATA: MALLORY PART No.	REPLACEMENT DATA: SPRAGUE PART No.	NOTES
C65	330		23-3567	1469-00033	D6-331	DM-BT33	811-331		MS-333	
C66	680		23-3568	1464-00068	D6-681	DM-BT68	811-681		MS-368	
C67	330		23-3456	S3S30	D6-331	TP39	GP3K-331	UC-5333	5GA-T33	
C68	.047	600	23-1775	S3-P47	DF-503	CUB4P47		PT4047	47M-S47	
C69	.15	400	23-2361			CUB4P15		PT4015	47M-P15	
C70	150	4000	23-3563							
C71	100	2000		HVD-30-0001	DD30-101	VS-T1	S1KV-101	DC3031	30GA-T1	

CONTROLS

ITEM No	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: ZENITH PART No.	REPLACEMENT DATA: CENTRALAB	REPLACEMENT DATA: CLAROSTAT	REPLACEMENT DATA: IRC	REPLACEMENT DATA: MALLORY PART No	INSTALLATION NOTES
R1A	1Meg	½	63-3273	AB-69	A47-1Meg-8	QU-157	U-54	Volume
B	Shaft		Not Req.	AK-3	FS-3	Not Req.	Not Req.	Attach to R1A.
C	Switch		Not Req.	KB-1	SWE-12	Q17-133	U5-26	Attach to R1A.
R2A	500K	½	63-3264	AB-51		Q17-133	TAP53R	Brightness-See Note 1.
B	Shaft		Not Req.	AK-19		TQ	Not Req.	Attach to R2A.
R2A	500K	½	63-3289	AB-51		Q17-133	U-50	Brightness-See Note 2
B	Shaft		Not Req.	AK-4		Not Req.	Not Req.	Attach to R2A.
R3A	750KΩ	½	63-3268	AB-66	A47-750K-8	QU-156	TAP-754L	Vertical Hold-See Note 1.
B	Shaft		Not Req.	AK-19	RM-3	TQ	Not Req.	Attach to R3A.
R3A	750KΩ	½	63-3266	AB-66	A47-750K-8	QU-156	TA16L	Vertical Hold-See Note 2.
B	Shaft		Not Req.	AK-4	KS8-3	Not Req.	Not Req.	Attach to R3A.
R4A	3500Ω	½	63-3266	AB-3	A47-4000-S	QU-114	TAP352L	Vertical Linearity-See Note 1.
B	Shaft		Not Req.	AK-19	RM-3	TQ	Not Req.	Attach to R4A.
R5A	8.5Meg	½	63-3263	AB-69+	A47-7.5Meg+6	QU-142+	TAP855L+	Vertical Size-See Notes 1 & 3.
B	Shaft		Not Req.	AK-19	RM-3	TQ	Not Req.	Attach to R5A.
R5A	8.5Meg	½	63-3294	AB-69+	A47-7.5Meg+6	QU-142+	TAP855L+	Vertical Size-See Notes 2 & 3.
B	Shaft		Not Req.	AK-19	RM-3	TQ	Not Req.	Attach to R5A.
R6A	50KΩ	½	63-3295	AB-31	A47-50K-S	QU-123	TA54L+	Horizontal Hold-See Note 1.
B	Shaft		Not Req.	Not Req.	RM-3	TQ	Not Req.	Attach to R6A.
R8A	50KΩ	½	63-3296	AB-31	A47-50K-S	QU-123	TA54L	Horizontal Hold-See Note 2.
B	Shaft		Not Req.	AK-4	KS8-3	Not Req.	Not Req.	Attach to R8A.
R7A	7000Ω	2	63-3277		A43-7500	WK-7500	R7500L	Contrast (Wire Wound) See Note 1.
B	Shaft		Not Req.		KS8-3	Not Req.	D8-36	Attach to R7A.
R7A	7000Ω	2	63-3288		V-136	WK-7500	R7500L	Contrast (Wire Wound) See Note 2.
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	D8-36	Attach to R7A.
R8	750Ω	2	63-3284		39-800			Buzz (Wire Wound)

Note 1. Used in chassis 17X30, 17X30U.
Note 2. Used in chassis 17X32, 17X32U.
Note 3. Stop at 7.5Meg.
+ Connect 1Meg resistor in series with the right hand terminal of the control, and the lead connecting in the same terminal of the original control (control viewed from shaft end, terminals down).

RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: ZENITH PART No.	REPLACEMENT DATA: IRC PART No.	NOTES
R9	470KΩ	1	63-1808	BTS-470K	
R10	470KΩ	1	63-1898	BTS-470K	
R11	15KΩ	1	63-1834	BTS-15K	
R12	100KΩ	1	63-1869	BTS-100K	
R13	100KΩ	1	63-1869	BTS-100K	
R14	1500Ω	1	63-1792	BTS-1500	
R15	2700Ω	1	63-1803		
R16	10KΩ	1	63-1837		
R17	330Ω	1	63-1766	BTS-390	
R18	12KΩ	2	63-1091	BTA-12K	
R19	100KΩ	1	63-1869		
R20	15KΩ	1	63-1834		
R21	100KΩ	1	63-1869		
R22	2.2Meg	1	63-1858	BTS-2.2Meg	
R23	820KΩ	1	63-1908	BTS-820K	
R24	270KΩ	1	63-1887	BTS-270K	
R25	2.2Meg 5%	1	63-1854	BTS-2.2Meg 5%	
R26	1Meg	1	63-1911	BTS-1Meg	
R27	6.8Meg 5%	1	63-1949	BTS-6.8Meg 5%	
R28	220KΩ	1	63-1883	BTS-220K	
R29	5.6Meg	1	63-1943	BTS-5.6Meg	
R30	680KΩ	1	63-1903	BTS-680K	
R31	1.5Meg	1	63-1919	BTS-1.5Meg	
R32	470KΩ	1	63-1898		
R33	100KΩ	1	63-1796	BTS-1000	
R34	270Ω	1	63-1781	BTS-270	
R35	18KΩ	1	63-1838	BTS-18K	
R36	47ΩΩ	1	63-1772	BTS-470Ω	
R37	56Ω	1	63-1733	BTS-56	
R38	120KΩ	1	63-1873	BTS-120K	
R39	120KΩ	1	63-1873	BTS-120K	
R40	470Ω	1	63-1773	BTS-470	
R41	15Ω	1	63-1708	BTS-15	Note 1
R42	5600Ω	1	63-1821	BTS-5600	
R43	5400Ω	4	63-3574		
R44	82Ω	1	63-1740	BTS-82	
R45	4700Ω	1	63-1812	BTS-4700	
R46	22KΩ	1	63-1841	BTS-22K	
R47	1Meg	1	63-1911	BTS-1Meg	
R48	47KΩ	1	63-1914	BTA-47K	
R49	68Ω	1	63-1760	BTS-68	
R50	22KΩ	1	63-1841	BTS-22K	
R51	33KΩ	1	63-1848	BTS-33K	
R52	2700Ω	1	63-1573	BTA-2700	
R53	100KΩ	1	63-1870	BTS-100K	
R54	100KΩ	1	63-1870	BTS-100K	
R55	33KΩ	1	63-1846	BTS-33K	
R56	680Ω	1	63-1772	BTS-680	
R57	1.5Meg	1	63-1918	BTS-1.5Meg	
R58	22KΩ	2	63-3141	BTH-22K	
R59	470Ω	1	63-1771	BTS-470	
R60	680Ω	1	63-2290	BTA-680	
R61	220KΩ	1	63-1883	BTS-220K	
R62	2.2Meg	1	63-1915	BTS-2.2Meg	
R63	68KΩ	1		BTS-68K	
R64	82KΩ	1	63-1841	BTS-82K	
R65	100KΩ	1	63-1870	BTS-100K	
R66	390KΩ	1	63-1894	BTS-390K	
R67	330KΩ	1	63-1890	BTS-330K	
R68	100KΩ	1	63-1869	BTS-100K	
R69	220Ω	1	63-1758	BTS-220	
R70	2.2Meg	1	63-1925	BTS-2.2Meg	
R71	47KΩ	1	63-1855	BTS-47K	
R72	100KΩ	1	63-1869	BTS-100K	
R73	1200Ω	1	63-1976	BTA-1200	
R74	68Ω	1	63-1726	BTS-68	
R75	150KΩ	1	63-1877	BTS-150K	
R76	560Ω	1			
R77	680Ω	1			
R78	1Meg	1	63-1911		
R79	1Meg	1	63-1911		
R80	4700Ω	1	63-1813		
R81	180KΩ	1	63-1880		
R82	5.6Meg	1	63-1943	BTS-5.6Meg	
R83	15KΩ	1	63-1065		
R84	180KΩ	1	63-1880		
R85	330KΩ	1	63-1890		
R86	150KΩ	1	63-2313	BTA-150K	
R87	15KΩ	1	63-1851		
R88	100KΩ	1	63-1786		
R89	100Ω	1	63-1744		
R90	4700Ω	1	63-1898		
R91	100Ω	1	63-1744		
R92	82000	2	63-1951		
R93	47KΩ	2	63-3282		
R94	2.2Ω	1	63-3114	BW-2.2	
R95	100KΩ	1	63-1873	BTS-100K	
R96	8.2Ω	2	63-3918		Note 2

Note 1. Not used in some versions.
Note 2. Used on chassis 17X33 only.

TRANSFORMER (POWER)

ITEM No.	RATING: PRI	RATING: SEC. 1	RATING: SEC. 2	RATING: SEC. 3	REPLACEMENT DATA: ZENITH PART No.	REPLACEMENT DATA: Hallerdson PART No.	REPLACEMENT DATA: Merit PART No.	REPLACEMENT DATA: Stancor PART No.	REPLACEMENT DATA: Thorderson PART No.	REPLACEMENT DATA: Triad PART No.
T1	117VAC	500VCT	5VAC		95-1440				26R33 ①	
	1.44A	.260ADC	3A							

① Tape 5V winding, use low taps on HV secondary,tape other taps, parallel and phase 6.3V windings, use mounting bracket.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No	USE	REPLACEMENT DATA: ZENITH PART No.	REPLACEMENT DATA: Hallerdson PART No.	REPLACEMENT DATA: Merit PART No.	REPLACEMENT DATA: RCA TYPE No	REPLACEMENT DATA: Rom PART No.	REPLACEMENT DATA: Stancor PART No.	REPLACEMENT DATA: Thorderson PART No.	REPLACEMENT DATA: Triad PART No.
T2	Horiz. Output Trans.	S-22451 ①							
T3	Vert. Output Trans.	95-1441	Z1900 ② ③	A-2823 ② ③		V307 ② ③	A-8113 ②	26S73	A-108X ② ③
T4A	Yoke (90°) Horiz. (13.6MH)	98-1495	DF806 ③	MDF-81 ③	237DN ③	Y90F13/4T ③	DY-13A ③	Y-16 ③	Y-40-1 ③
B	Vert. (42.5MH)								

① Includes tertiary winding and terminal board Zenith Part No. S-23446, winding and terminal board assembly, Zenith Part No. S-22446.
② Connect as auto transformer.
③ Drill new mounting hole(s).
④ Connect horizontal damping network across terminals #3 & #7, use original if necessary.
⑤ Use 9 to 1 turns ratio.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI	IMPEDANCE: SEC.	REPLACEMENT DATA: ZENITH PART No.	REPLACEMENT DATA: Hallerdson PART No.	REPLACEMENT DATA: Merit PART No.	REPLACEMENT DATA: Stancor PART No.	REPLACEMENT DATA: Thorderson PART No.	REPLACEMENT DATA: Triad PART No.	NOTES
T5	10.7KΩ	3.4Ω	95-1428	Z1117 ①	A-2922 ①	A-3850 ①	24S53 ①	S-11X	① Drill one new mtg. hole.

SPEAKER

ITEM No.	RATINGS: SIZE	RATINGS: FIELD	RATINGS: V. C. IMP	REPLACEMENT DATA: ZENITH PART No.	REPLACEMENT DATA: QUAM PART No.	NOTES
SP1	6"	PM	3.4Ω	49-775 ①	4A1	① Used in Models X2320R, RU, X2322R, RU, C, GU,
	5 1/4"	PM	3.4Ω	49-781 ①	5A1	L, LU, R, RU, Y, YU
	7 1/2"	PM	3.4Ω	49-780 ①	8A31	② Used in Models X2323E, EU, R, RU
	7 1/2"	PM	3.4Ω	49-750 ①	8A31	③ Used in Models X2347E, EU, R, RU
	10"	PM	3.4Ω	49-753 ①	10A51	④ Used in Models X2324E, EU, R, RU, Y,YU
	3 1/2"	PM	11.8Ω	49-777 ①	3A1BT	⑤ Used in Models 2248E, EU, R, RU, Y, YU
	10"	PM	3.4Ω	49-768 ①	10A51	⑥ Used in Models X2320R, RU, E, RU

COILS (RF-IF)

ITEM No.	USE	DC RES.: PRI.	DC RES.: SEC.	REPLACEMENT DATA: ZENITH PART No.	REPLACEMENT DATA: MEISSNER PART No.	REPLACEMENT DATA: MERIT PART No.	REPLACEMENT DATA: MILLER PART No.	NOTES
L1	IF Trap	0Ω		30-567				
L2	IF Trap	0Ω		30-567				
L3	Ant. Match-ing Trans.	.1DCT	0Ω	S-22679				
L4	Ant. Coil	0Ω		30-558				Channel 2
L5	Ant. Coil	0Ω		30-558				Channel 3
L6	Ant. Coil	0Ω		30-558				Channel 4
L7	Ant. Coil	0Ω		30-558				Channel 5
L8	Ant. Coil	0Ω		30-558				Channel 6
L9	Ant. Coils	0Ω						Channel 7 thru 13
L10	Ant. Coil	0Ω		30-600				
L11	Neut. Coil	0Ω		30-550				
L12	Mixer Coil	0Ω		30-569				Channel 13
L13	Mixer Coils	0Ω		30-571				Channels 7 thru 13
L14	Mixer Coil	0Ω		30-579				Channel 6
L15	Mixer Coil	0Ω		30-580				Channel 5
L16	Mixer Coil	0Ω		30-581				Channel 4
L17	Mixer Coil	0Ω		30-581				Channel 3
L18	Mixer Coil	0Ω		30-581				Channel 2
L19	Mixer Coil	0Ω		30-581				Channel 1
L20	Osc. Coil	0Ω		30-573				Channel 2
L21	Osc. Coil	0Ω		30-573				Channel 3
L22	Osc. Coil	0Ω		30-574				Channel 4
L23	Osc. Coil	0Ω		30-575				Channel 5
L24	Osc. Coil	0Ω		30-576				Channel 6
L25	Osc. Coils	0Ω						Channels 7 thru 13
L26	Osc. Coil	0Ω		30-577				Channel 13
L27	RF Coil	0Ω		30-549				
L28	RF Coil	0Ω		30-601				
L29	Conv. Plate	.8Ω		S-22549				
L30A	1st Video IF	.4Ω		S-23228				
B	47.25MC Trap	0Ω		S-23221				
C	47.35MC Trap	0Ω						
	Shunt Coil	0Ω		30-604				
L31	2nd Video IF	.1Ω	.1Ω	S-22344	19-5002*	TV-137*	6332*	
L32	3rd Video IF	.1Ω	.1Ω	S-22345	19-5004*	TV-135*	6334*	
L33	4th Video IF	.5Ω	.9Ω	S-23015				Complete Assembly Part No. S-23017
L34	Series Peak-ing Coil	4.8Ω		S-23444	19-8023		4626	26 Microhenries
L35	Shunt Peak-ing Coil	1Ω		S-23434			6166	576 Microhenries
L35A	4.5MC Trap	1Ω		S-23350				
B	1st Sound IF	1.9Ω						
L37	Series Peak-ing Coil	5.8Ω		S-22890	19-3125▲	TV-182	6153▲	137 Microhenries, wound on 1SKΩ resistor Complete Assembly Part No. S-22348
L38	2nd Sound IF	.9Ω	.9Ω	S-22347	17-3498▲	TV-118▲	6303▲	
L39	Quadrature Coil	8.2Ω		S-23030	30-1004▲	TV-181▲	1480▲	

* Use adaptor plate and detune trap.
■ Use adaptor plate.
▲ Paralled with 18KΩ resistor.
● Drill mounting hole.

TRANSFORMER (HORIZ. OSC.)

ITEM No.	DC RES.: PRI.	DC RES.: SEC.	REPLACEMENT DATA: ZENITH PART No.	REPLACEMENT DATA: MEISSNER PART No.	REPLACEMENT DATA: MERIT PART No.	REPLACEMENT DATA: MILLER PART No.	REPLACEMENT DATA: RCA TYPE No	REPLACEMENT DATA: Rom PART No.	REPLACEMENT DATA: Thorderson PART No.	REPLACEMENT DATA: Triad PART No.	NOTES
L40	110Ω		S-22553	19-1276	TV-163	6310			26S-5		

FILTER CHOKE

ITEM No.	RATINGS: TOTAL DIRECT CURRENT	RATINGS: D. C. RESISTANCE	REPLACEMENT DATA: INDUCTANCE @ CURRENT 1000 Cps	REPLACEMENT DATA: ZENITH PART No.	REPLACEMENT DATA: Hallerdson PART No.	REPLACEMENT DATA: Merit PART No.	REPLACEMENT DATA: Stancor PART No.	REPLACEMENT DATA: Thorderson PART No.	REPLACEMENT DATA: Triad PART No.
L41	.260ADC	68Ω	1.7HY	95-1376	C3097 ①	C-3996 ①	C-2356 ①	26C44	C-25X

① Drill one new mounting hole.

PARTS LIST AND DESCRIPTIONS (Continued)

FUSES

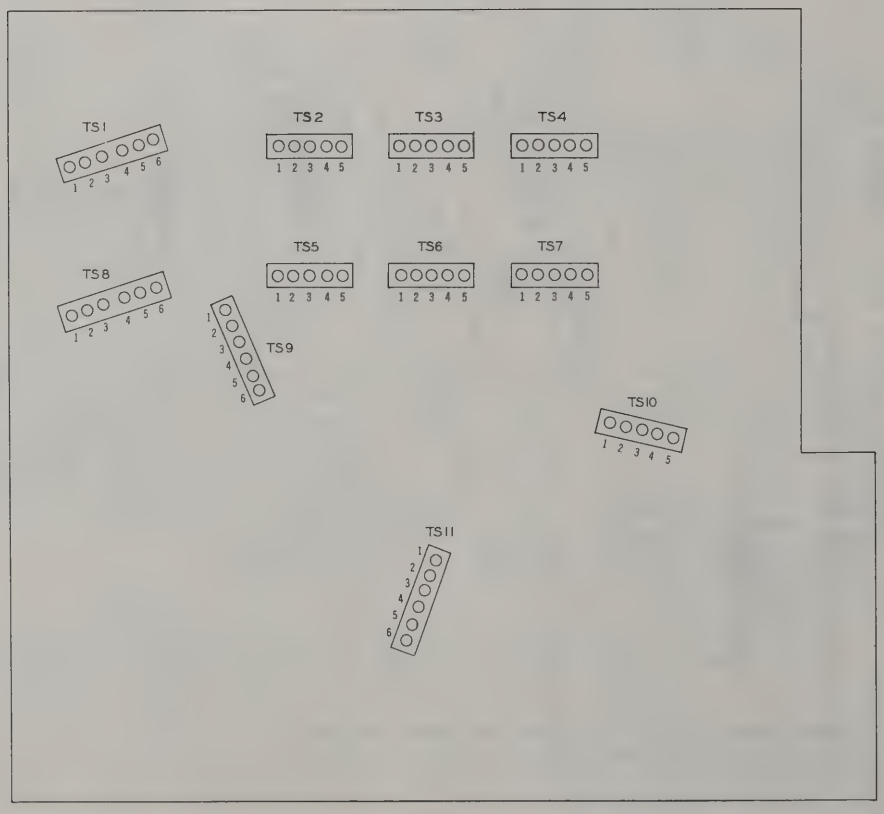
ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			ZENITH PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG	2/10A 125V	136-23		313.200 (3AG S/B 2/10A)	357001	MDL 2/10	4405

CRYSTAL DIODES

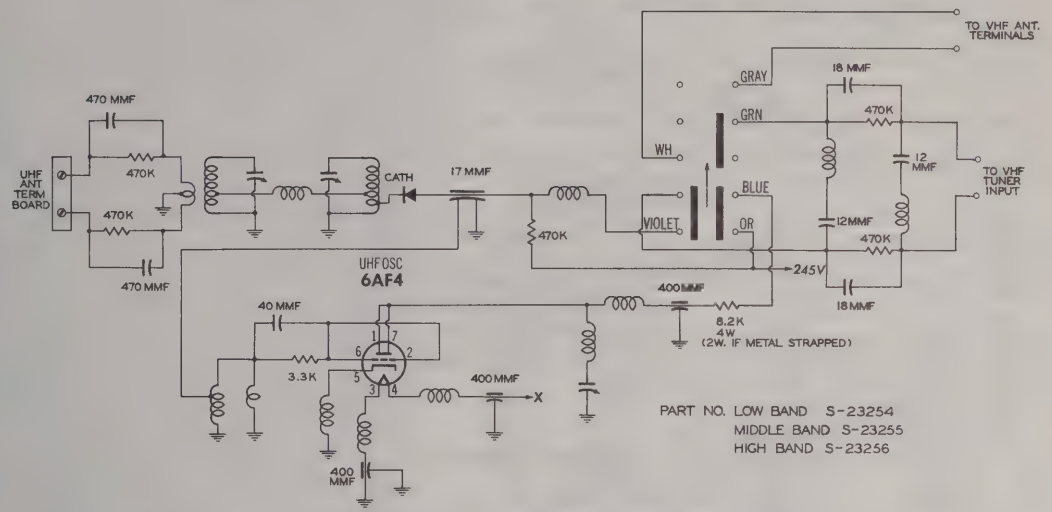
ITEM No.	ORIG. TYPE	REPLACEMENT DATA		NOTES
		ZENITH PART No.	SYLVANIA PART No.	
M2	CK706A	103-1	1N60	Video Det.

MISCELLANEOUS

ITEM No.	PART NAME	ZENITH PART No.	NOTES
M3	Pilot Light	100-166	#PR-12 - Used in chassis 17X22, U
M4	Tuner	S-22778	VHF - Chassis 17X20, 17X22
	Tuner	S-22779	VHF - Chassis 17X20U, 17X22U
M5	Tuner	S-22790	UHF - Chassis 17X20U, 17X22U
M6	Video Det. Assy.	S-23017	Includes M2, L33, C34
M7	Switch	85-564	Local-distance (DPDT - Slide Type)
M8	Integrator	87-5	Vertical
M9	Integrator	87-4	Vertical
M10	Width Control	199-193	
M11	Centering Device	S-22560	
M12	Ion Trap	S-22574	
	Cabinet	14-1815	Models X2220R, RU, X2222R, RU
	Cabinet	14-1855	Models X2222Y, YU
	Cabinet	14-1863	Models X2222E, EU
	Cabinet	14-1864	Models X2222G, GU
	Cabinet	14-1865	Models X2222L, LU
	Cabinet	14-1866	Top Section - Models X2224R, RU
	Cabinet	14-1867	Top Section - Models X2224E, EU
	Cabinet	14-1868	Top Section - Models X2224Y, YU
	Cabinet	14-1870	Companion Base - Models X2224R, RU
	Cabinet	14-1871	Companion Base - Models X2224E, EU
	Cabinet	14-1872	Companion Base - Models X2224Y, YU
	Cabinet	14-1856E	Models X2232E, EU
	Cabinet	14-1856R	Models X2232R, RU
	Cabinet	14-1854E	Models X2247E, EU
	Cabinet	14-1854R	Models X2247R, RU
	Cabinet	14-1857E	Models X2248E, EU
	Cabinet	14-1857R	Models X2248R, RU
	Cabinet	14-1903R	Models X2280R, RU
	Cabinet	14-1903E	Models X2280E, EU



TERMINAL LOCATION CHART



PART NO. LOW BAND S-23254
MIDDLE BAND S-23255
HIGH BAND S-23256

SINGLE CHANNEL UHF ADAPTER USED WITH VHF TUNER S-22778

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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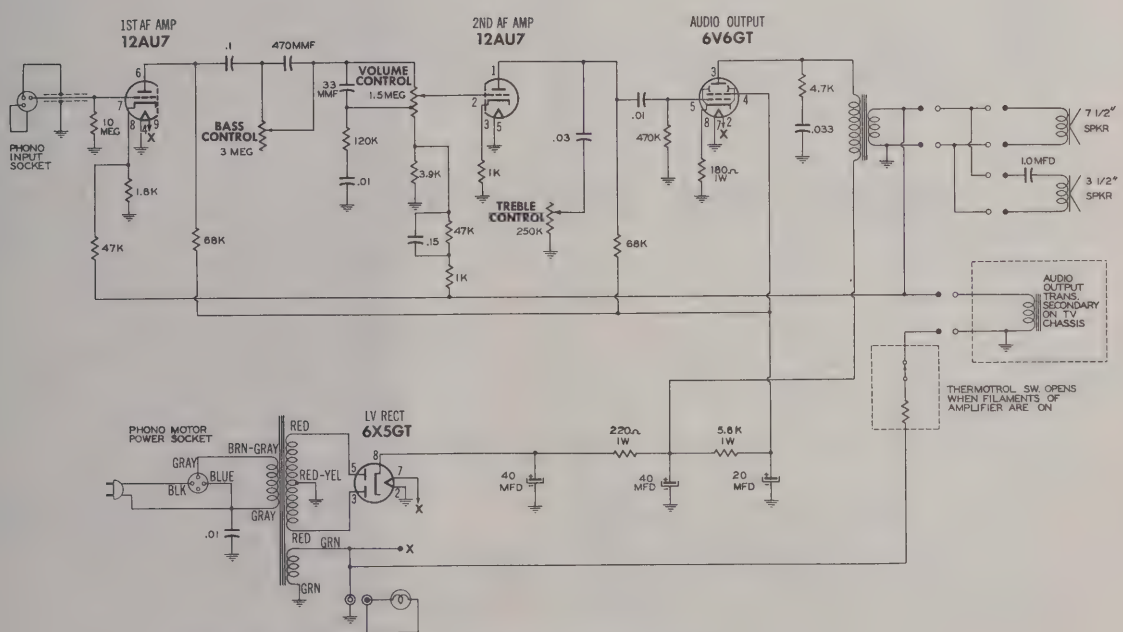
...MEADE ST.
DENVER, COLORADO

UHF TUNER SCHEMATIC



PHONO AMPLIFIER MODEL 3X01 USED WITH MODELS X2280E AND X2280R

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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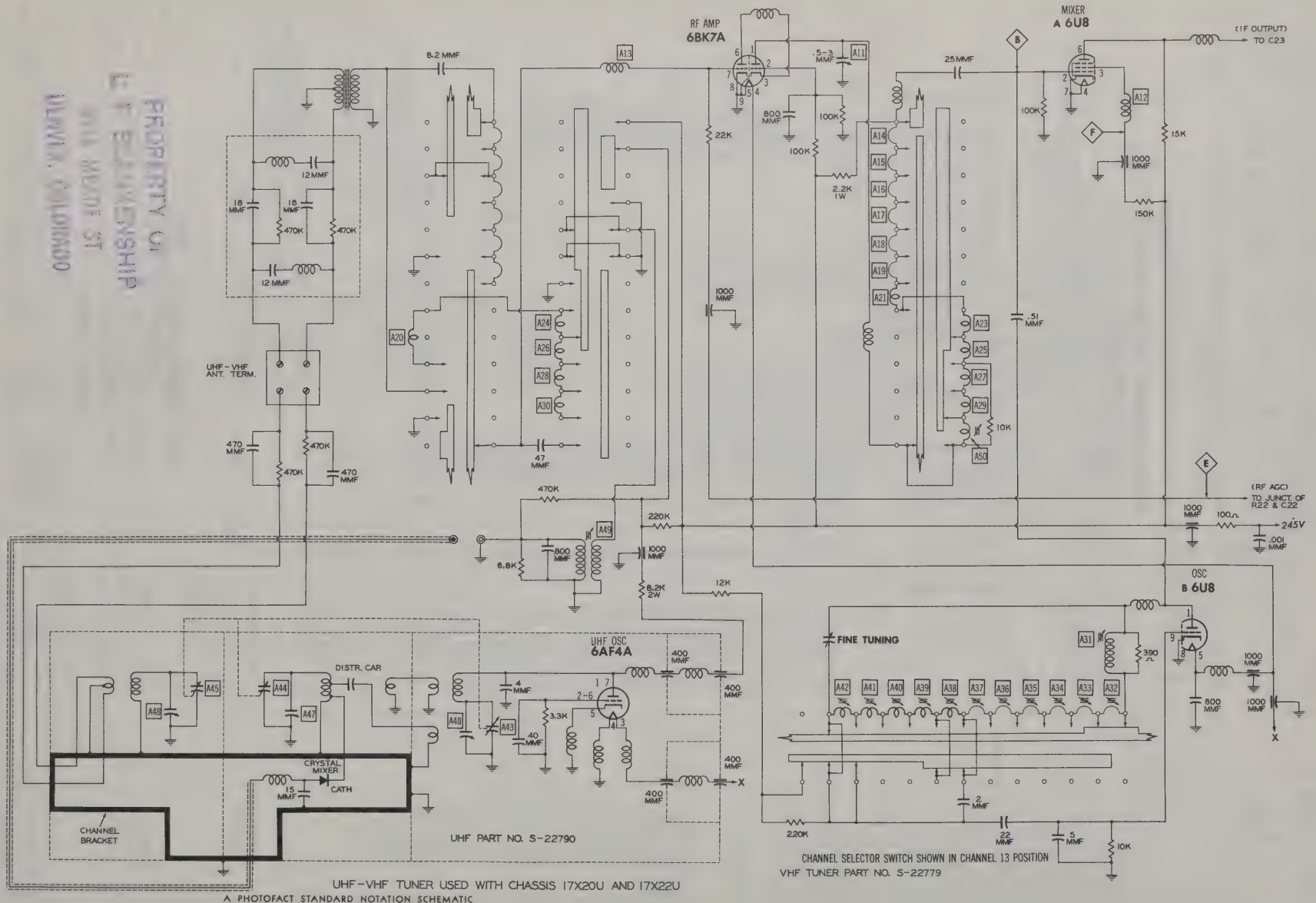
PHONO AMPLIFIER CIRCUIT



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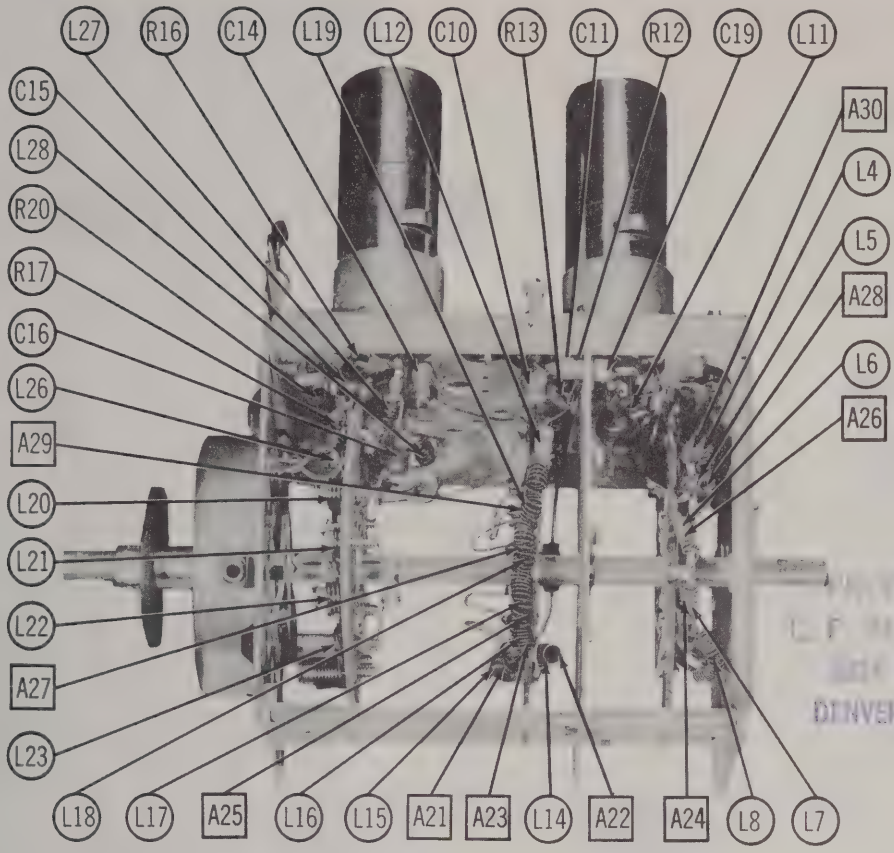
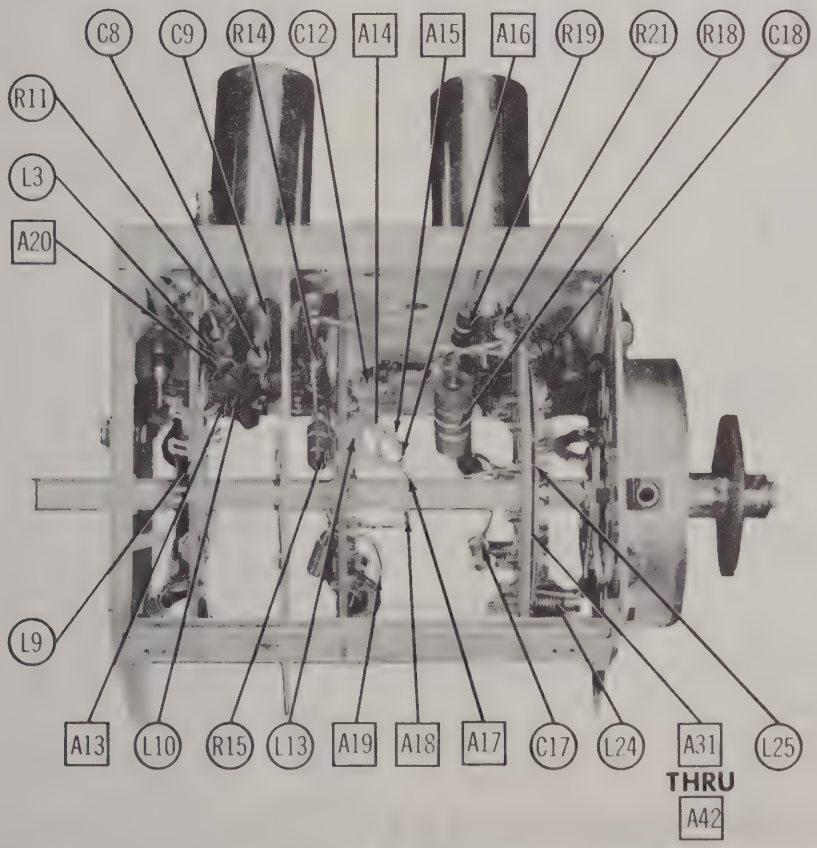
ALTERNATE VHF-UHF TUNER SCHEMATIC

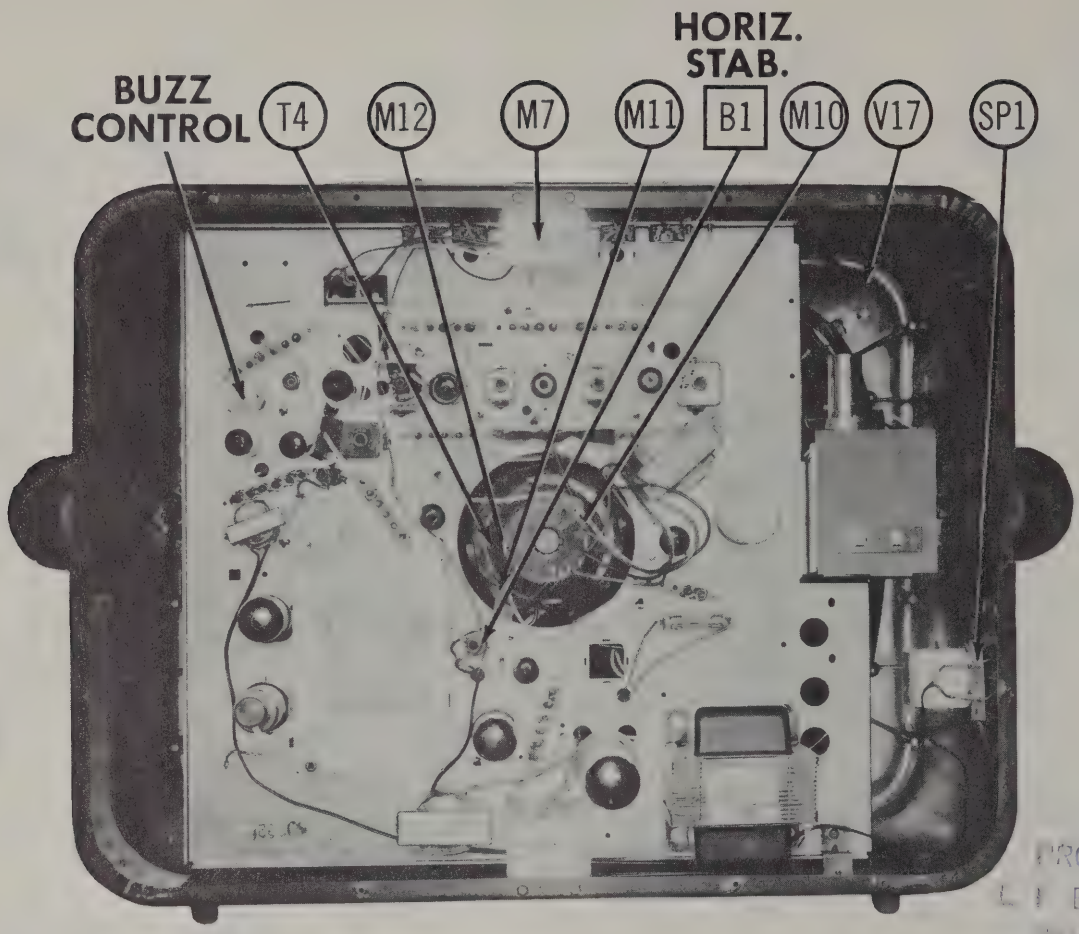


RF TUNER-RIGHT SIDE



RF TUNER-LEFT SIDE

UNIVERSITY OF
L. F. WANKENSHIP
1614 MEADE ST.
DENVER, COLORADO



PROPERTY OF
L. F. BLANKENSHIP
[illegible] MEADE ST.
DENVER, COLORADO

CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

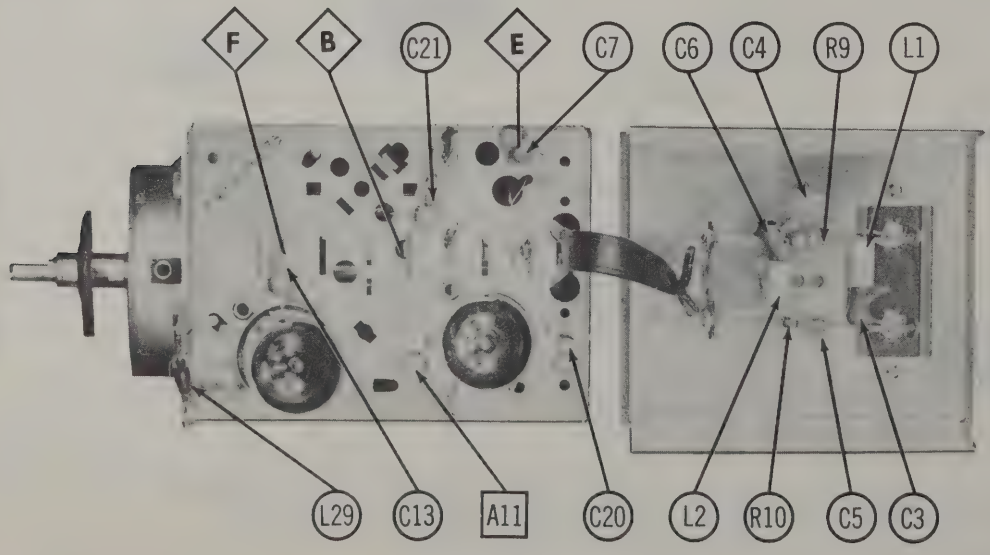
① Turn the set on and tune in a TV station, preferably a test pattern.

② Connect a .5MFD capacitor from point Ⓖ to chassis.

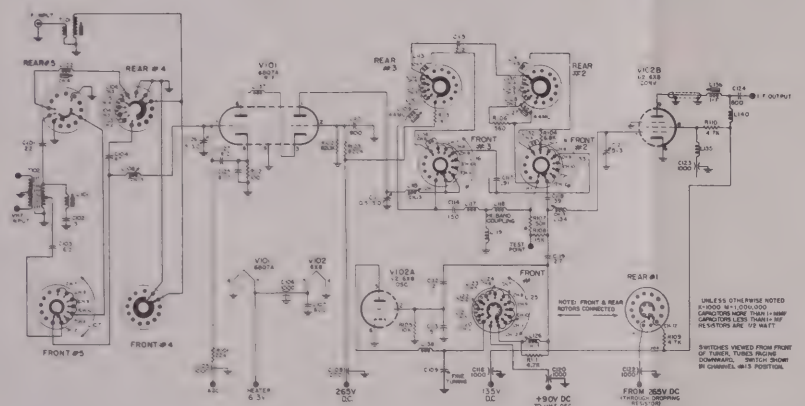
③ Set the horizontal hold control until the picture synchronizes horizontally, picture may not hold steady.

④ Remove the .5MFD capacitor from point Ⓖ and chassis.

⑤ Adjust the horizontal stabilizer slug (B1) until picture again locks into horizontal sync without readjusting the horizontal hold control.



RF TUNER TOP VIEW



GENERAL ELECTRIC MODEL

21C133
21C134
21C135
21C136
21C141
21C142

SCHEMATIC COURTESY OF

GENERAL ELECTRIC COMPANY

PROPERTY OF
L. F. BLANKENSHIP
3021 MEADE ST.
DENVER, COLORADO

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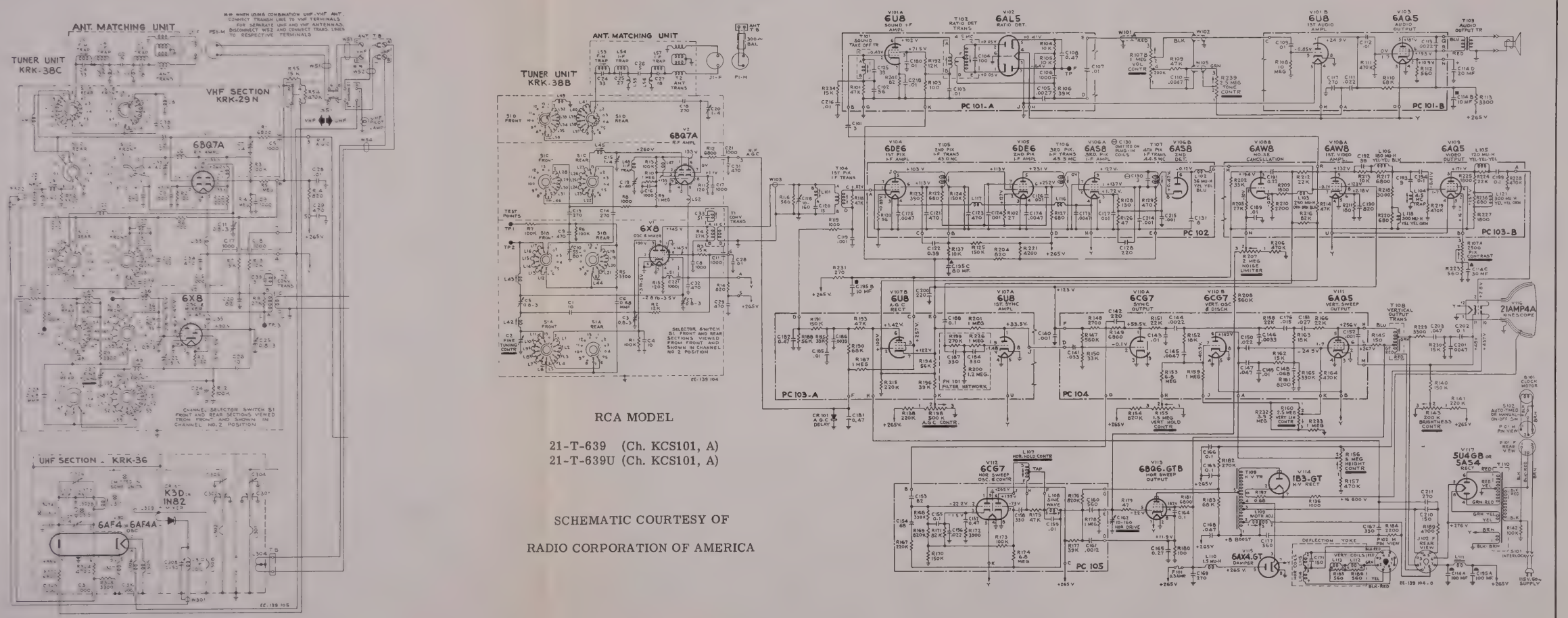


RCA MODEL

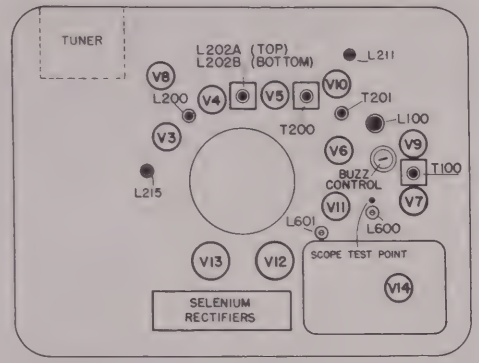
21-T-639 (Ch. KCS101, A)
21-T-639U (Ch. KCS101, A)

SCHEMATIC COURTESY OF

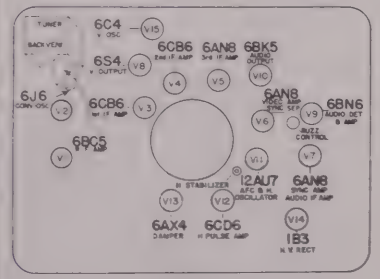
RADIO CORPORATION OF AMERICA

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

RAYTHEON



TUBE COMPLEMENT

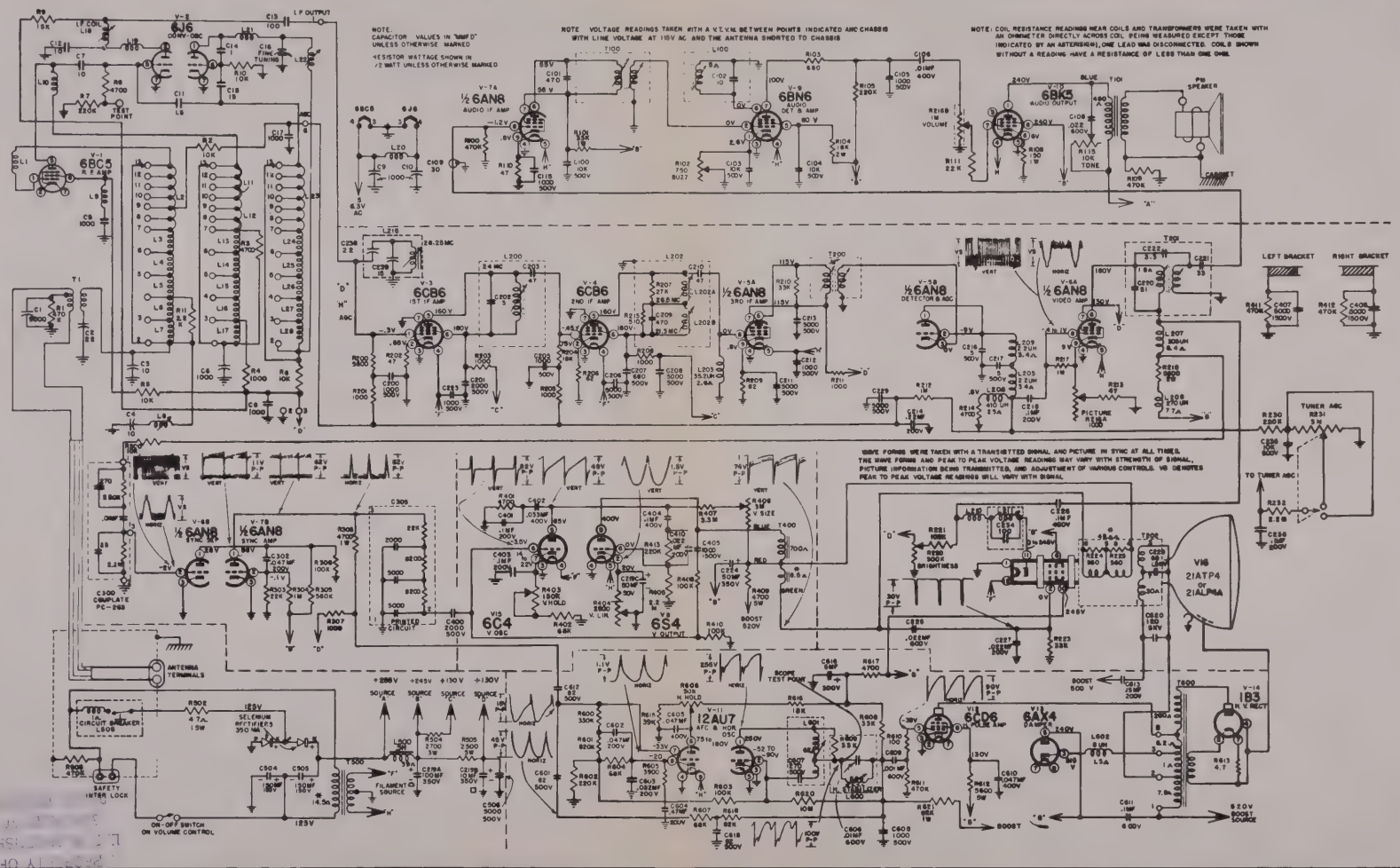


Schematic Ref. No.	RETMA TYPE	TUBE FUNCTION
V-1	6BC5	R. F. Amplifier
V-2	6J6	Oscillator - Converter
V-3-4	6CB6	IF Amplifier
V-5	6AN8	3rd IF Amp., Detector and AGC
V-6	6AN8	Video Amplifier and Sync. Sep.
V-7	6AN8	Sync Amp. and Audio IF Amp.
V-8	6S4	Vertical Output
V-9	6BN6	Audio Detector and Amplifier
V-10	6BK5	Audio Output
V-11	12AU7	AFC and Horizontal Osc.
V-12	6CD6	Horizontal Pulse Amplifier
V-13	6AX4	Horizontal Damper
V-14	1B3	H. V. Rectifier
V-15	6C4	Vertical Oscillator
V-16	21ALP4A or 21ATP4	21" Picture Tube

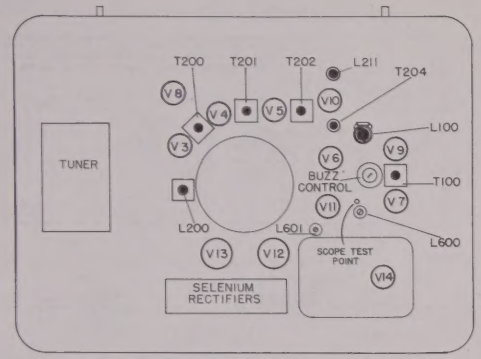
RAYTHEON MODEL

C-212B (Ch. 21T42)
C-212M (Ch. 21T42)
C-220 (Ch. 21T42)

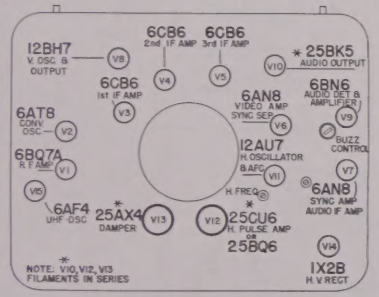
SCHEMATIC COURTESY OF RAYTHEON MANUFACTURING COMPANY


NOTE: CAPACITOR VALUES IN "MMFD" UNLESS OTHERWISE MARKED
*RESISTOR WATTAGE SHOWN IN 1/2 WATT UNLESS OTHERWISE MARKED
NOTE: VOLTAGE READINGS TAKEN WITH A V.T.V.M. BETWEEN POINTS INDICATED AND CHASSIS WITH LINE VOLTAGE AT 115V AC AND THE ANTENNA SHORTED TO CHASSIS
NOTE: COIL RESISTANCE READINGS NEAR COILS AND TRANSFORMERS WERE TAKEN WITH AN OHMMETER DIRECTLY ACROSS COIL BEING MEASURED EXCEPT THOSE INDICATED BY AN ASTERISK(*), ONE LEAD WAS DISCONNECTED. COILS SHOWN WITHOUT A READING HAVE A RESISTANCE OF LESS THAN ONE OHM.
WAVE FORMS WERE TAKEN WITH A TRANSMITTED SIGNAL AND PICTURE IN SYNC AT ALL TIMES. THE WAVE FORMS AND PEAK TO PEAK VOLTAGE READINGS MAY VARY WITH STRENGTH OF SIGNAL, PICTURE INFORMATION BEING TRANSMITTED, AND ADJUSTMENT OF VARIOUS CONTROLS. VB DENOTES PEAK TO PEAK VOLTAGE READINGS WILL VARY WITH SIGNAL
6J6
6BC5
6CB6
6AN8
6BK5
6S4
6BN6
12AU7
6CD6
6AX4
1B3
21ALP4A OR 21ATP4
TUNER AGC
LEFT BRACKET
RIGHT BRACKET
TO TUNER AGC
ANTENNA TERMINALS
SELENIUM RECTIFIERS 350 MA
CIRCUIT BREAKER
SAFETY INTER LOCK
ON-OFF SWITCH ON VOLUME CONTROL
SCOPE TEST POINT
PM SPEAKER
CABINET

© Howard W. Sams & Co., Inc. 1956 SET 306 FOLDER 16-S



TUBE COMPLEMENT



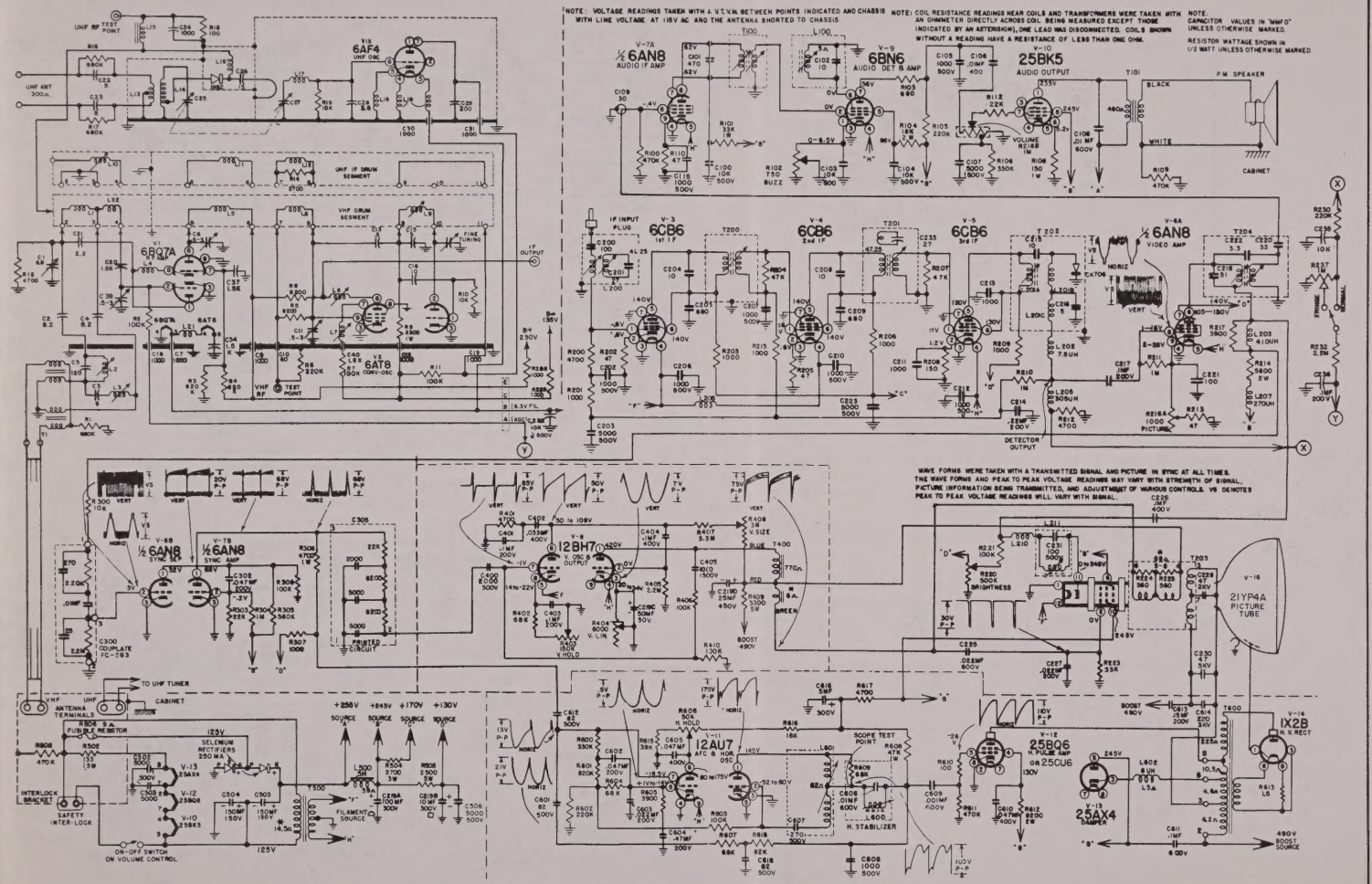
Schematic Ref. No.	RETMA TYPE	TUBE FUNCTION
V-1	6BQ7A	RF Amplifier
V-2	6AT8	Oscillator-Converter
V-3-4-5	6CB6	IF Amplifier
V-6	6AN8	Video Amplifier and Sync Sep.
V-7	6AN8	Sync. Amp. and Audio IF Amp.
V-8	12BH7	Vertical Osc. and Output
V-9	6BN6	Audio Detector and Amplifier
V-10	25BK5	Audio Output
V-11	12AU7	AFC and Horizontal Osc.
V-12	25BQ6	Horizontal Pulse Amplifier
V-13	25AX4	Damper
V-14	1X2B	H.V. Rectifier
V-15	6AF4	UHF Oscillator
V-16	21YP4A	21" Picture Tube

SCHEMATIC COURTESY OF

RAYTHEON MANUFACTURING COMPANY

RAYTHEON MODEL

UC-2185B (Ch. 21T39)
UC-2185M (Ch. 21T39)


NOTE: VOLTAGE READINGS TAKEN WITH A V.T.V.M. BETWEEN POINTS INDICATED AND CHASSIS WITH LINE VOLTAGE AT 115V AC AND THE ANTENNA SHORTED TO CHASSIS
NOTE: COIL RESISTANCE READINGS NEAR COILS AND TRANSFORMERS WERE TAKEN WITH AN OHMMETER DIRECTLY ACROSS COIL BEING MEASURED EXCEPT THOSE INDICATED BY AN ASTERISK(*), ONE LEAD WAS DISCONNECTED. COILS SHOWN WITHOUT A READING HAVE A RESISTANCE OF LESS THAN ONE OHM.
NOTE: CAPACITOR VALUES IN "MMFD" UNLESS OTHERWISE MARKED.
RESISTOR WATTAGE SHOWN IN 1/2 WATT UNLESS OTHERWISE MARKED.
WAVE FORMS WERE TAKEN WITH A TRANSMITTED SIGNAL AND PICTURE IN SYNC AT ALL TIMES. THE WAVE FORMS AND PEAK TO PEAK VOLTAGE READINGS MAY VARY WITH STRENGTH OF SIGNAL, PICTURE INFORMATION BEING TRANSMITTED, AND ADJUSTMENT OF VARIOUS CONTROLS. VS DENOTES PEAK TO PEAK VOLTAGE READINGS WILL VARY WITH SIGNAL.
UHF RF TEST POINT
UHF ANT 300Ω
6AF4 UHF OSC
UHF IF DRUM SEGMENT
VHF DRUM SEGMENT
FINE TUNING
6BQ7A R.F. AMP.
6AT8 CONV-OSC
VHF R.F. TEST POINT
IF OUTPUT
B+ 230V
B+ 135V
B+ 6.3V FIL.
V-7A ½ 6AN8 AUDIO IF AMP
V-9 6BN6 AUDIO DET & AMP
V-10 25BK5 AUDIO OUTPUT
T101
BLACK
WHITE
P.M. SPEAKER
CABINET
VOLUME R216B 1M
IF INPUT PLUG
V-3 6CB6 1st I.F.
V-4 6CB6 2nd I.F.
V-5 6CB6 3rd I.F.
V-6A ½ 6AN8 VIDEO AMP
T200
T201
T202
T204
HORIZ
VERT
R216A 1000 PICTURE
DETECTOR OUTPUT
V-8 12BH7 V. OSC & OUTPUT
V-7B ½ 6AN8 SYNC AMP
V-6B ½ 6AN8 SYNC SEP.
V. SIZE
V. LIN.
V. HOLD
PRINTED CIRCUIT
COUPLATE FC-263
TO UHF TUNER
VHF ANTENNA TERMINALS
UHF CABINET
125V SELENIUM RECTIFIERS 250 MA
+258V SOURCE
+245V SOURCE
+170V SOURCE
+130V SOURCE
FUSIBLE RESISTOR
INTERLOCK BRACKET
SAFETY INTER-LOCK
ON-OFF SWITCH ON VOLUME CONTROL
FILAMENT SOURCE
V-11 12AU7 A.F.C. & HOR. OSC.
H. HOLD
SCOPE TEST POINT
H. STABILIZER
V-12 25BQ6 or 25CU6 H. PULSE AMP
V-13 25AX4 DAMPER
V-14 1X2B H.V. RECT
V-15 6AF4 UHF OSC
V-16 21YP4A PICTURE TUBE
BRIGHTNESS
BOOST 490V
490V BOOST SOURCE